

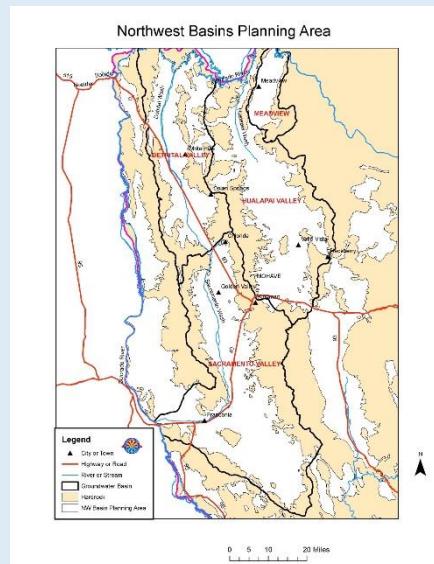


## Hydrologic and Water Use Information For The Northwest Basins Planning Area

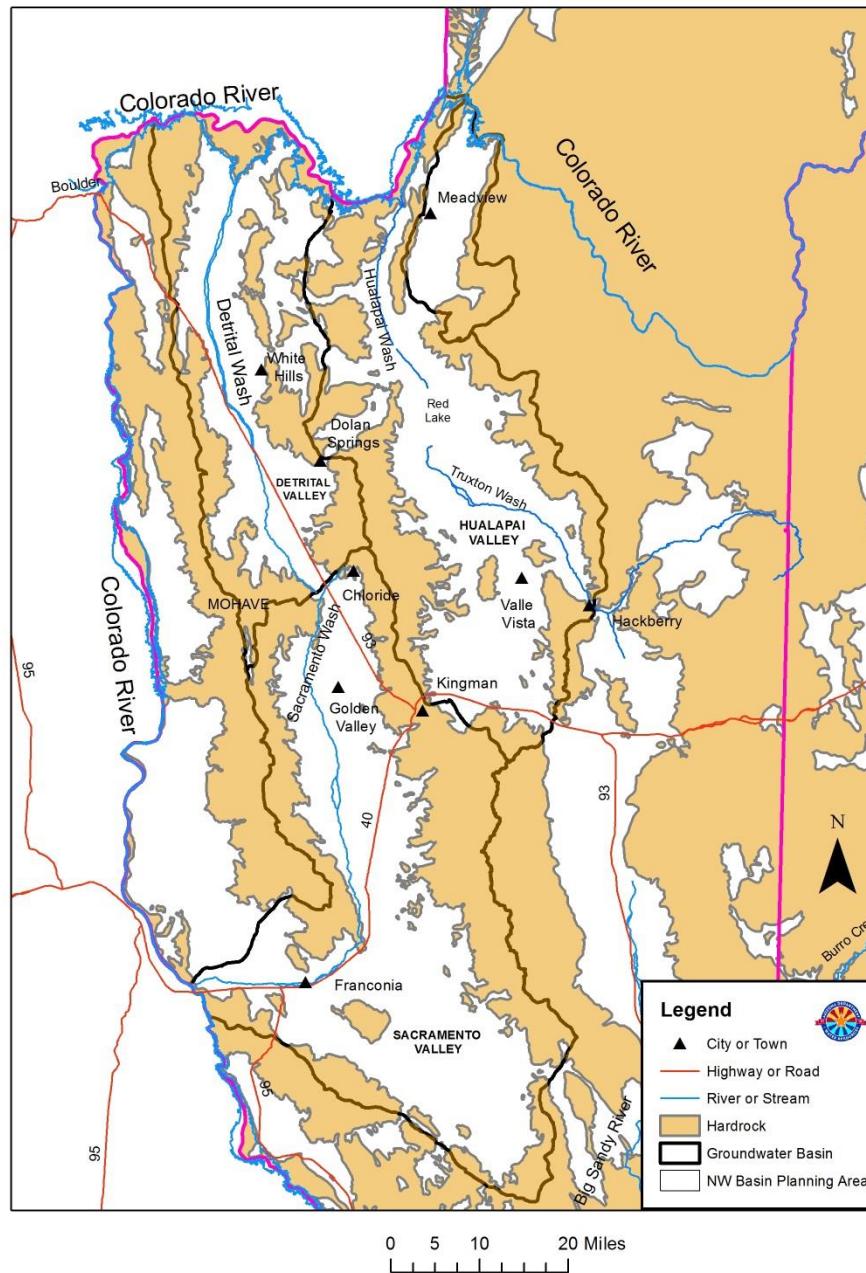
**Presented by Frank Corkhill  
Arizona Department of Water Resources  
Hydrology Division**

**June 29, 2016**

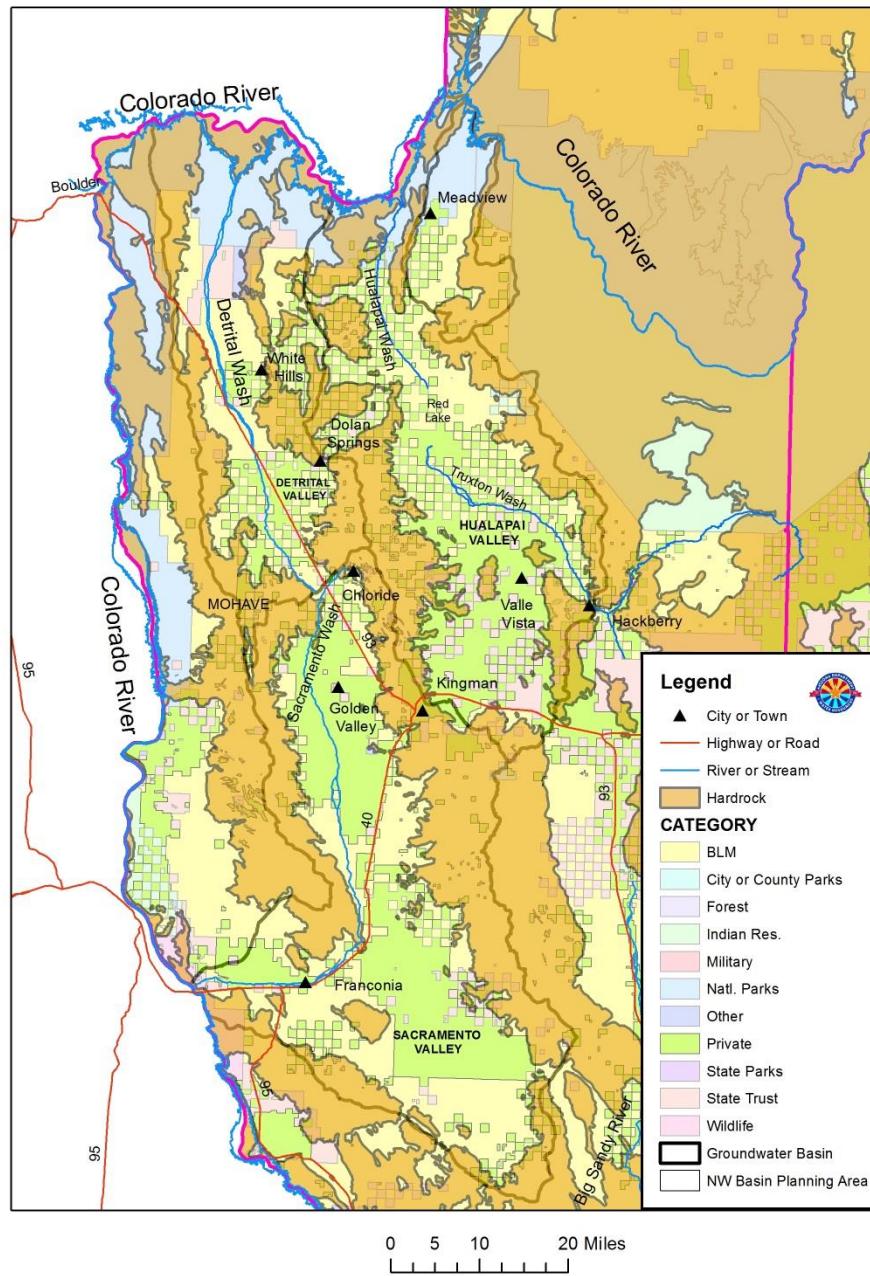
**Mohave County Administration Building  
Kingman, Arizona**



## Northwest Basins Planning Area



# Northwest Basins Land Ownership



## General Characteristics of Groundwater Basins In the Northwest Basin Planning Area

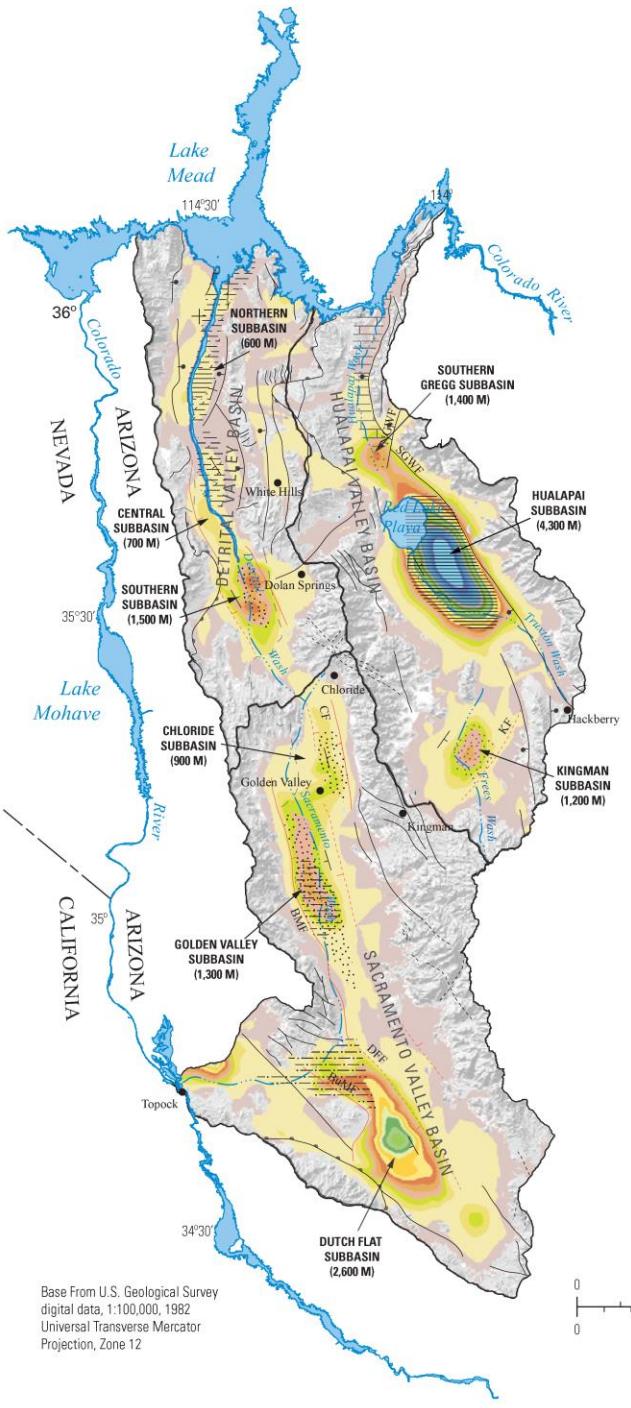
Basin Characteristic	Unit	Detrital Valley	Sacramento Valley	Hualapai Valley	Meadview
Basin Area	Square Miles	892	1,587	1,212	190
Estimated GW Storage <sup>1</sup>	Acre-Feet	7,900,000	28,000,000	11,400,000	<1,000,000
Estimated Natural Recharge <sup>2</sup>	Acre-Feet/Year	< 1,500	6,000	5,400	NA
Estimated 2014 Basin Pumpage <sup>3</sup>	Acre-Feet/Year	< 300	9,700	16,600	< 300

<sup>1</sup> Detrital Valley, Sacramento Valley and Hualapai Valley groundwater storage estimates from USGS SIR 2012-5275. Estimates are to a depth of 400 meters (~1,300 feet below land surface). Groundwater in storage estimates have upper and lower boundaries of .81 to 15.7 MAF, 17.6 to 30.3 MAF and 5.5 to 17.3 MAF; for the Detrital Valley, Sacramento Valley and Hualapai Valley basins, respectively. Meadview groundwater storage estimate from Arizona Water Commission 1975.

**Note: Not all groundwater in storage is practically recoverable for hydrogeologic, technical, economic or other reasons.**

<sup>2</sup> Detrital, Sacramento and Hualapai natural recharge estimates from USGS SIR 2013-5122.

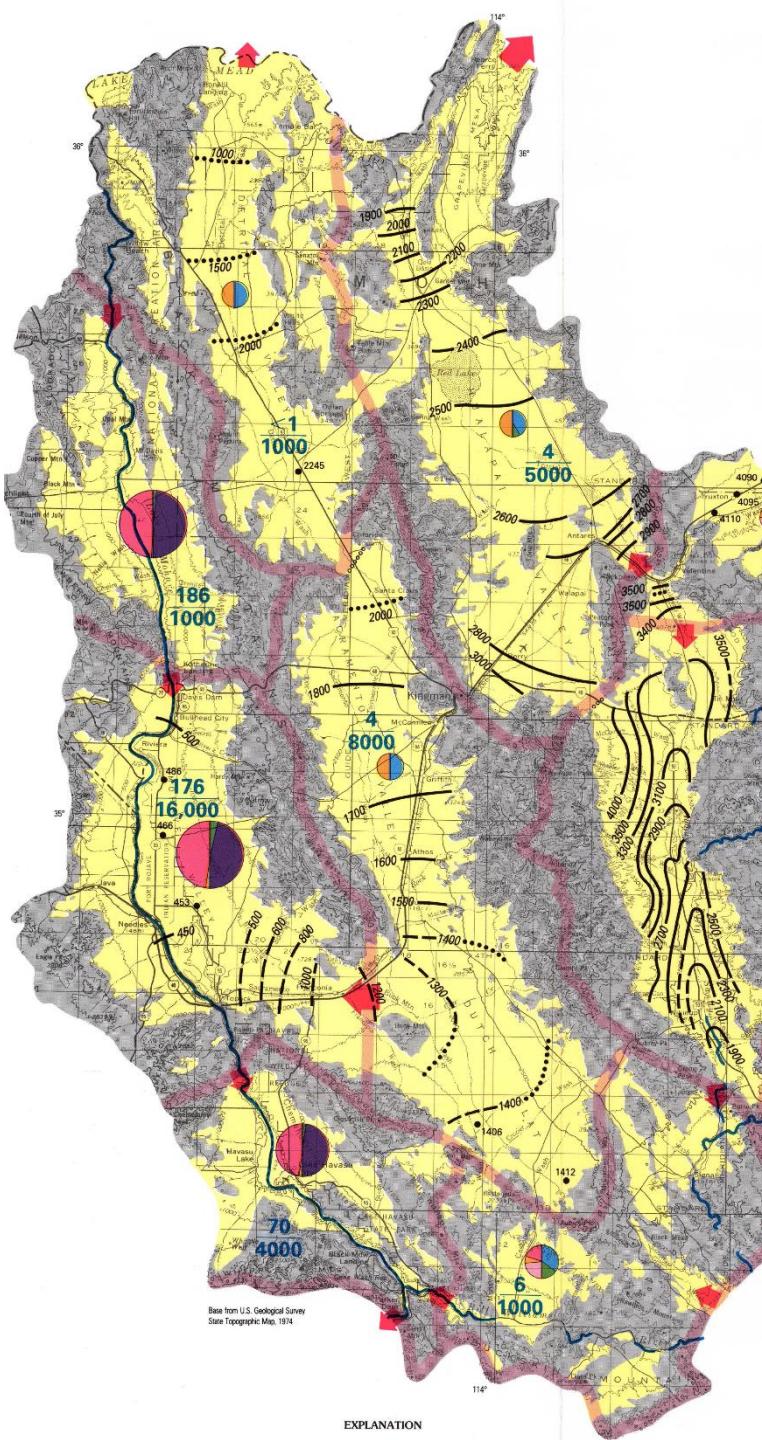
<sup>3</sup> 2014 basin pumpage estimates from USGS Annual Arizona Water Use Spreadsheet (USGS-Tucson, 2016)



## USGS Estimated Depth to Bedrock (Meters)

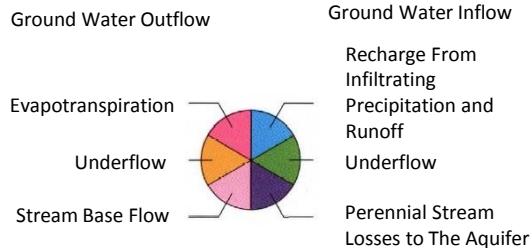
Source:  
USGS Scientific  
Investigations Report  
2012-5275

# Predevelopment Groundwater Flow in The NW Basins Planning Area



(USGS Hydrologic Investigations Atlas 664)

## Ground Water Budget



# Major Groundwater Uses In The Northwest Basins

# Municipal



Golden Valley 68

Oatman Rd

10

40

© 2016 Google

New Kingman-Butler

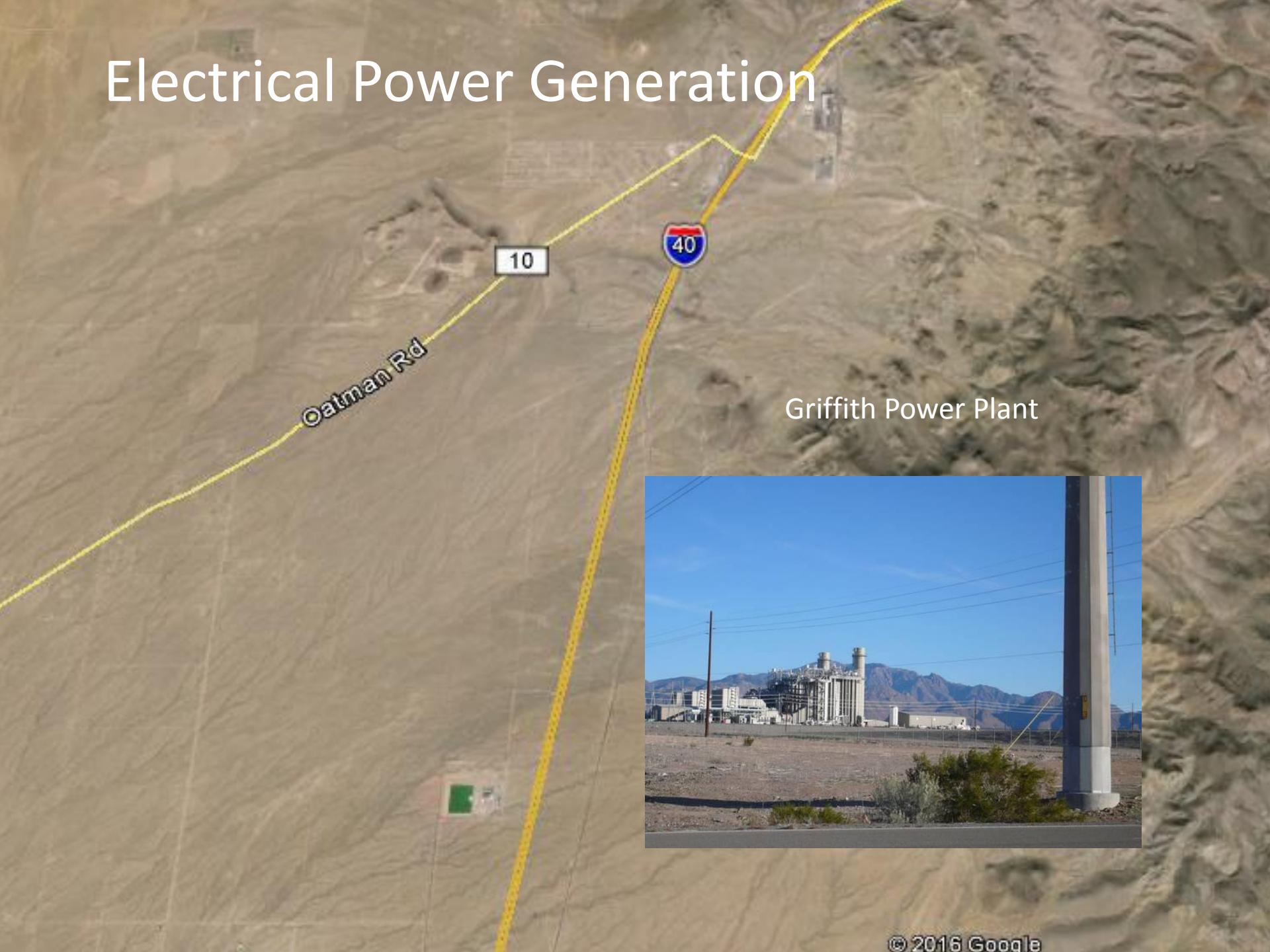
66

93

Kingman



# Electrical Power Generation



Mining

93

Chloride



Mineral Park Mine

© 2016 Google

Corbett

An aerial photograph showing a large agricultural area in a desert. The fields are organized into a grid pattern, with some sections appearing darker green than others, likely due to irrigation. A prominent feature is a long, narrow, dark green strip running vertically through the center-left of the image, possibly a canal or a more intensively irrigated path. The surrounding land is a light tan or beige color, indicating dry, non-irrigated soil. In the bottom right corner, there is a small inset image showing a ground-level view of a dry, brown field with some low-lying vegetation and a range of mountains in the background.

Irrigation

Farming in Red Lake Area

© 2016 Google

# Irrigation



Farming in Long Mountain Area

Farming in Golden Valley Area

# Irrigation

Aztec Rd

223

205

Shinarump Rd

Historic Route 66

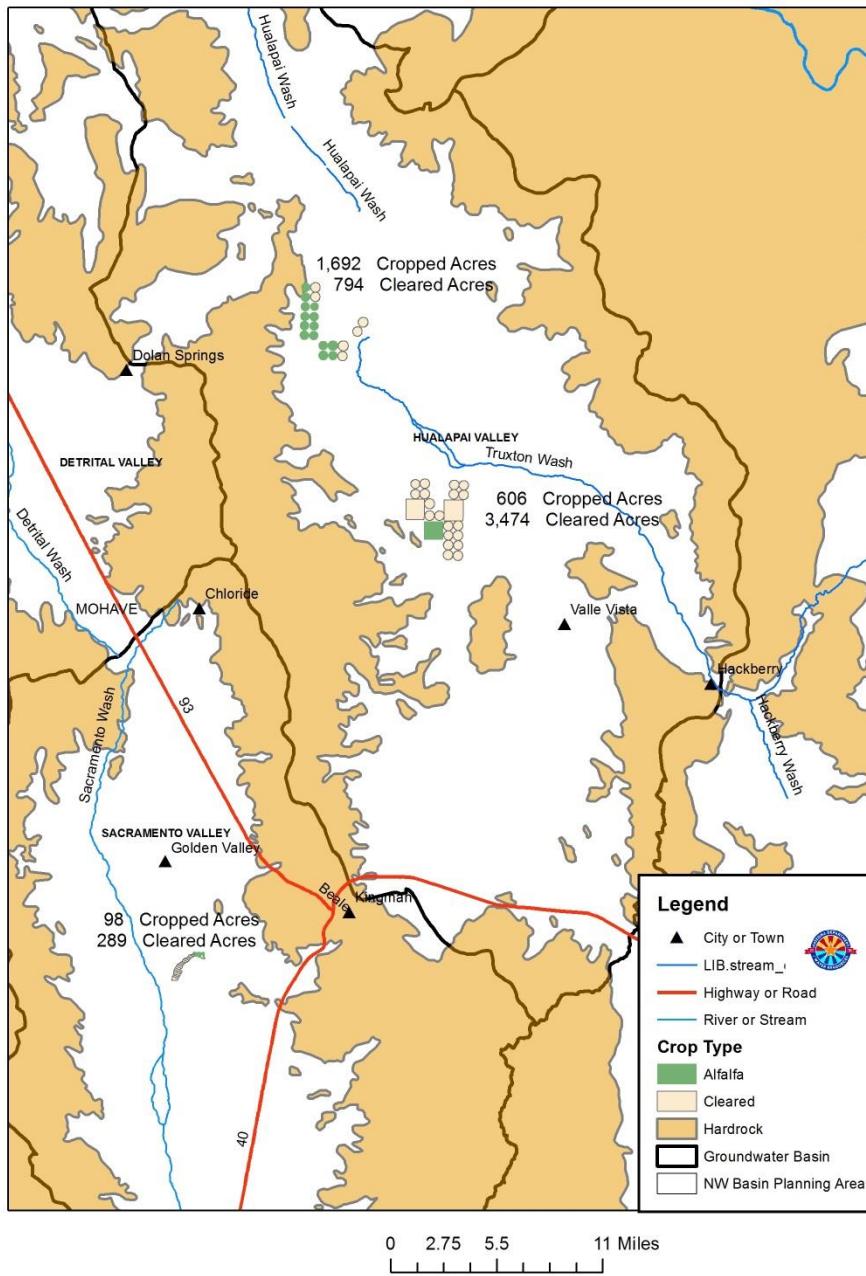
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40

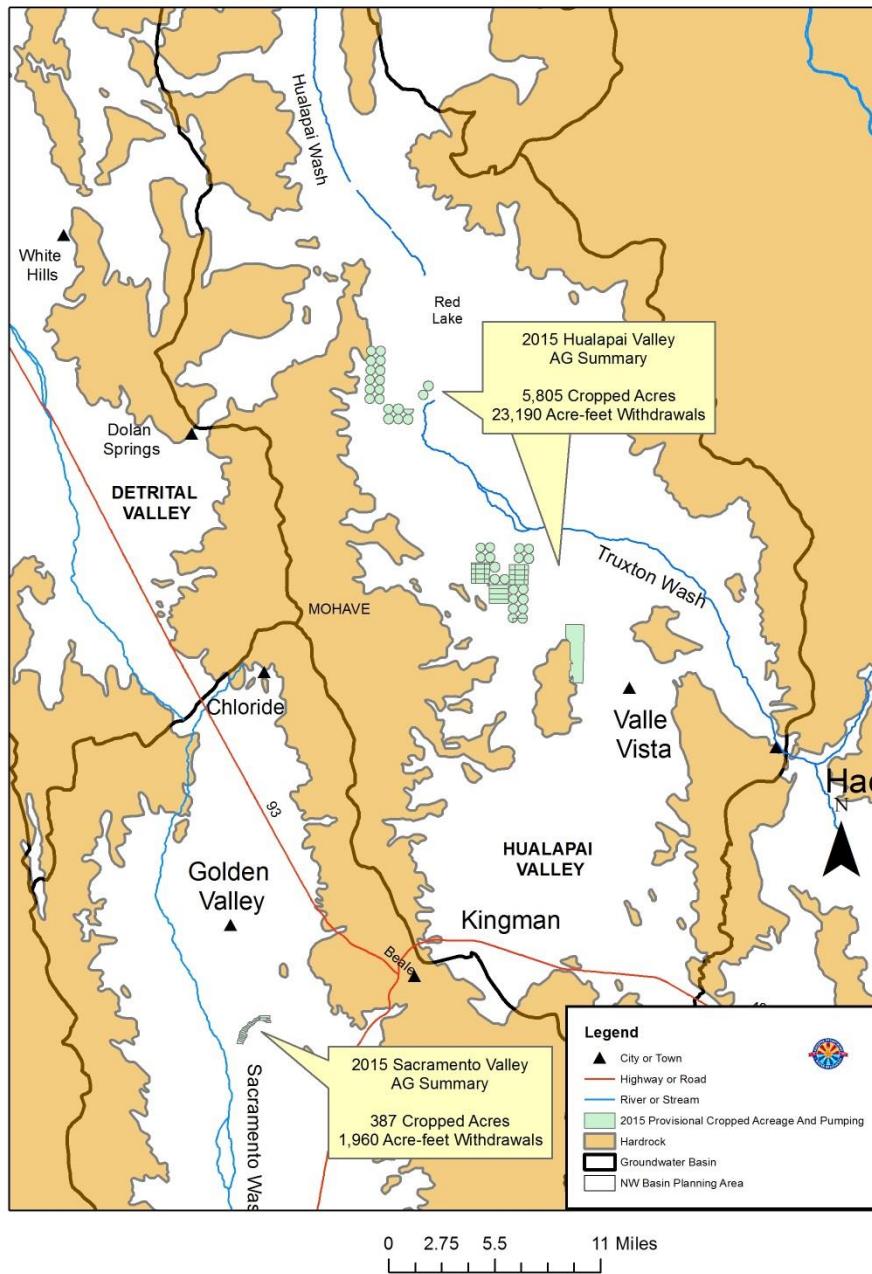
© 2016 Google

Google earth

## USGS 2014 Cropped or Cleared Agricultural Areas in NW Basins Planning Area



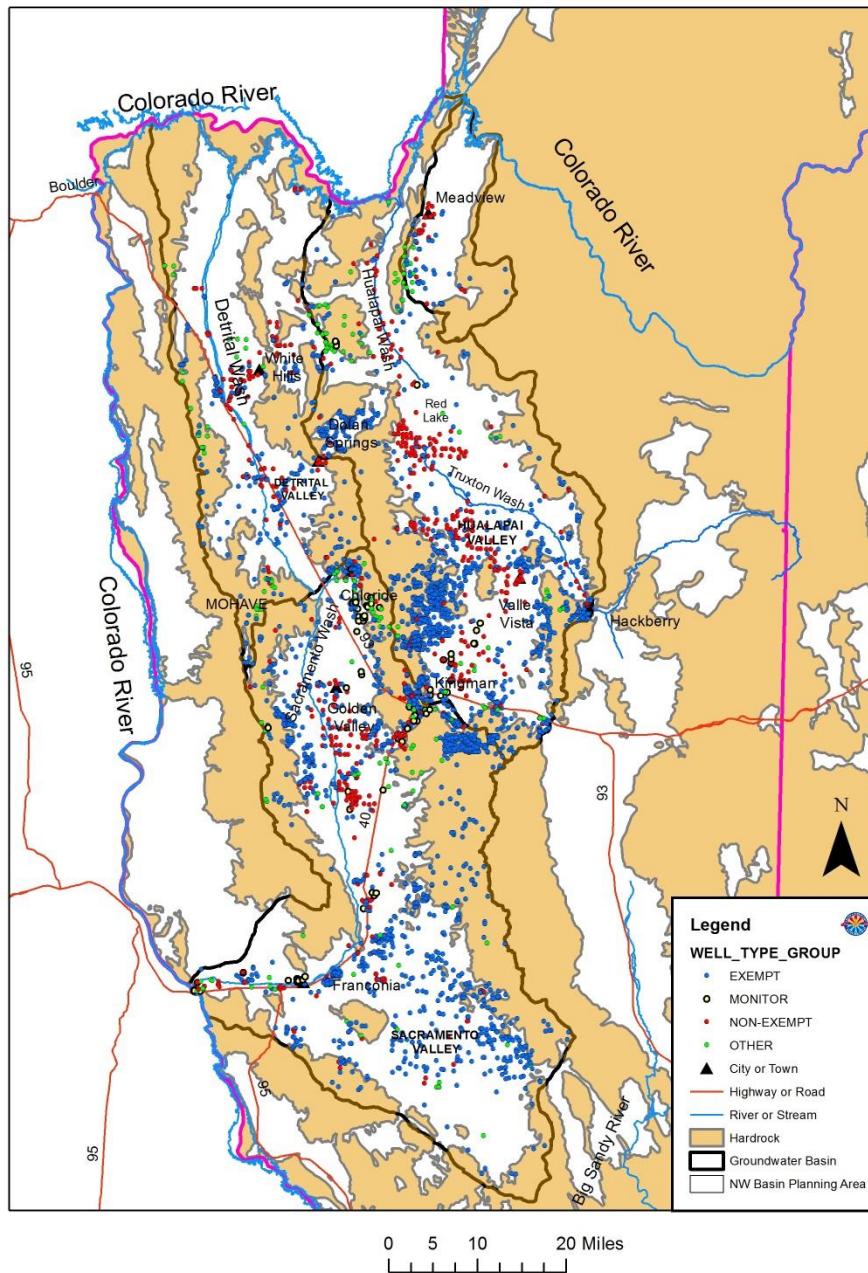
## 2015 USGS Agricultural Acreage and Pumpage in Northwest Basins Planning Area



# Registered Well Applications Per Year In The Northwest Basins

BASIN	Detrital	Hualapai	Meadview	Sacramento
1963				1
1971				1
1980	1	7		7
1981	2	39		26
1982	86	202	17	315
1983	5	19		19
1984	8	23		29
1985	5	16	1	21
1986	6	12		22
1987	7	25		26
1988	7	18		16
1989	7	29	4	55
1990	16	34	2	36
1991	10	38		49
1992	17	36	6	58
1993	7	41	5	67
1994	11	41	1	58
1995	16	54		58
1996	6	34		36
1997	6	56		54
1998	6	47		50
1999	6	67		86
2000	14	47	3	120
2001	10	49	3	84
2002	7	88	3	93
2003	16	75	3	80
2004	13	117	3	96
2005	38	109	5	121
2006	27	90	3	152
2007	13	59	4	80
2008	14	37	2	50
2009	6	17	1	31
2010	6	17		14
2011	5	17	5	16
2012	4	19	1	30
2013	2	22	2	29
2014	4	111	2	21
2015	4	43	2	50
2016		11		8
Total	418	1766	78	2165

## Northwest Basins Registered Wells



USGS Estimated Groundwater Pumping in Northwest Basin Planning Area 1940 – 2014  
Units = x 1,000 Acre-feet (AF)

Year	Hualapai				Sacramento					Detrital	Meadview
	Total	Ag	Muni	Mining	Total	Ag	Muni	Mining	Electric Power	Muni	Muni
1940					<0.5						
1941					<0.5						
1942					<0.5						
1943					<0.5						
1944					<0.5						
1945					<0.5						
1946					<0.5						
1947					<0.5						
1948					<0.5						
1949					<0.5						
1950					<0.5						
1951					<0.5						
1952					<0.5						
1953					<0.5						
1954					<0.5						
1955					<0.5						
1956					<0.5						
1957					<0.5						
1958					<0.5						
1959					<0.5						
1960	<0.5				<0.5						
1961	1.0				<0.5						
1962	1.0				<0.5						
1963	1.0				<0.5						
1964	2.0				<0.5						
1965	2.0				4.0						
1966	3.0				4.0						
1967	4.0				4.0						
1968	4.0				6.0						
1969	4.0				5.0						
1970	4.0				4.0						
1971	4.0				5.0						
1972	4.0				6.0						
1973	4.0				5.0						
1974	5.0				7.0						
1975	4.0				8.0						
1976	4.0				8.0						
1977	4.0				7.0						

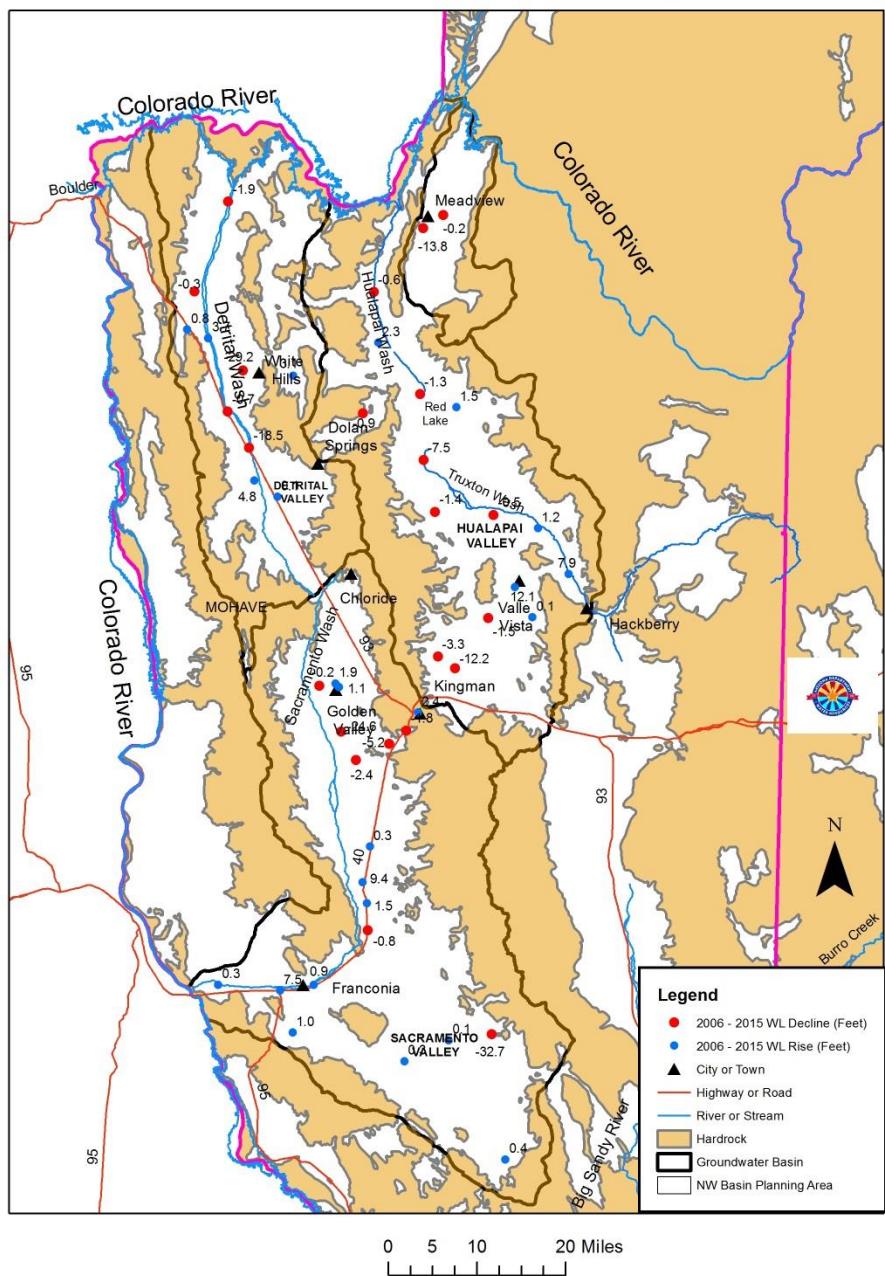
Year	Hualapai				Sacramento					Detrital	Meadview
	Total	Ag	Muni	Mining	Total	Ag	Muni	Mining	Electric Power	Muni	Muni
1978	6				8						
1979	6				6						
1980	4				4						
1981	6				5						
1982	5				2						
1983	5				2						
1984	5				2						
1985	5				2						
1986	5				2						
1987	5				2						
1988	5				2						
1989	6				2						
1990	6				2						
1991	4.7	4.4	<0.3	1.6		1.3	<0.3			<0.3	<0.3
1992	5.7	5.4	<0.3	1.8		1.5	<0.3			<0.3	<0.3
1993	5.7	5.4	<0.3	1.8		1.5	<0.3			<0.3	<0.3
1994	6.3	6	<0.3	1.9		1.6	<0.3			<0.3	<0.3
1995	6.6	6.3	<0.3	2		1.7	<0.3			<0.3	<0.3
1996	7.3	7	<0.3	2		1.7	<0.3			<0.3	<0.3
1997	7.2	6.9	<0.3	1.9		1.6	<0.3			<0.3	<0.3
1998	7.1	6.8	<0.3	2.1		1.8	<0.3			<0.3	<0.3
1999	7.8	7.5	<0.3	2.2		1.9	<0.3			<0.3	<0.3
2000	8.5	8.2	<0.3	2.15		1.8	0.35			<0.3	<0.3
2001	8.3	8	<0.3	3.45		2	0.35	1.1	<0.3	<0.3	
2002	8.8	8.5	<0.3	4.1		2	0.5	1.6	<0.3	<0.3	
2003	8.6	8.3	<0.3	3.6		2	<0.3	1.3	<0.3	<0.3	
2004	8.7	8.4	<0.3	3.8		2.4	<0.3	1.1	<0.3	<0.3	
2005	9.4	9.1	<0.3	3.45		2.3	<0.3	0.85	<0.3	<0.3	
2006	9.1	8.8	<0.3	4.1		2.5	<0.3	1.3	<0.3	<0.3	
2007	9.3	9	<0.3	5		2.8	<0.3	1.9	<0.3	<0.3	
2008	9.5	9.2	<0.3	4.8		2.9	<0.3	1.6	<0.3	<0.3	
2009	8.9	8.6	<0.3	8.8		2.7	4.5	1.6	<0.3	<0.3	
2010	8.5	8.2	<0.3	8.8		2.1	5.3	1.4	<0.3	<0.3	
2011	8.7	8.4	<0.3	9.5		3.1	5.1	1.3	0.4	<0.3	
2012	8.2	7.9	<0.3	8.3		3	3.8	1.5	0.35	<0.3	
2013	8.6		8.3	<0.3	8.7		2	4.9	1.8	<0.3	<0.3
2014	16.6	8.0	8.3	<0.3	9.7	<0.3	1.9	5.3	2.2	<0.3	<0.3

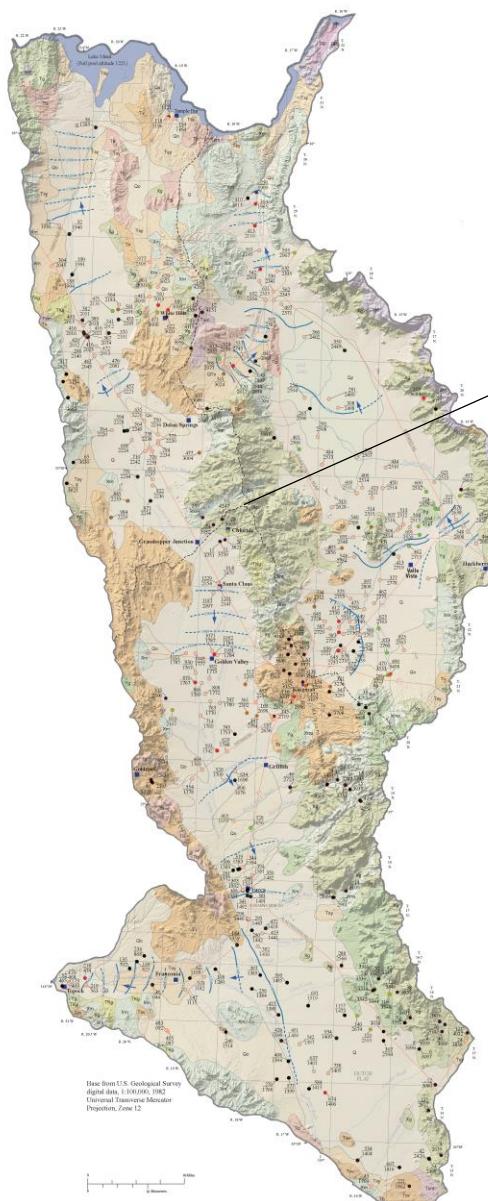
# Groundwater Conditions in In The Northwest Basins

# Number of Annual GWSI Water Level Measurements In Northwest Basin Planning Area

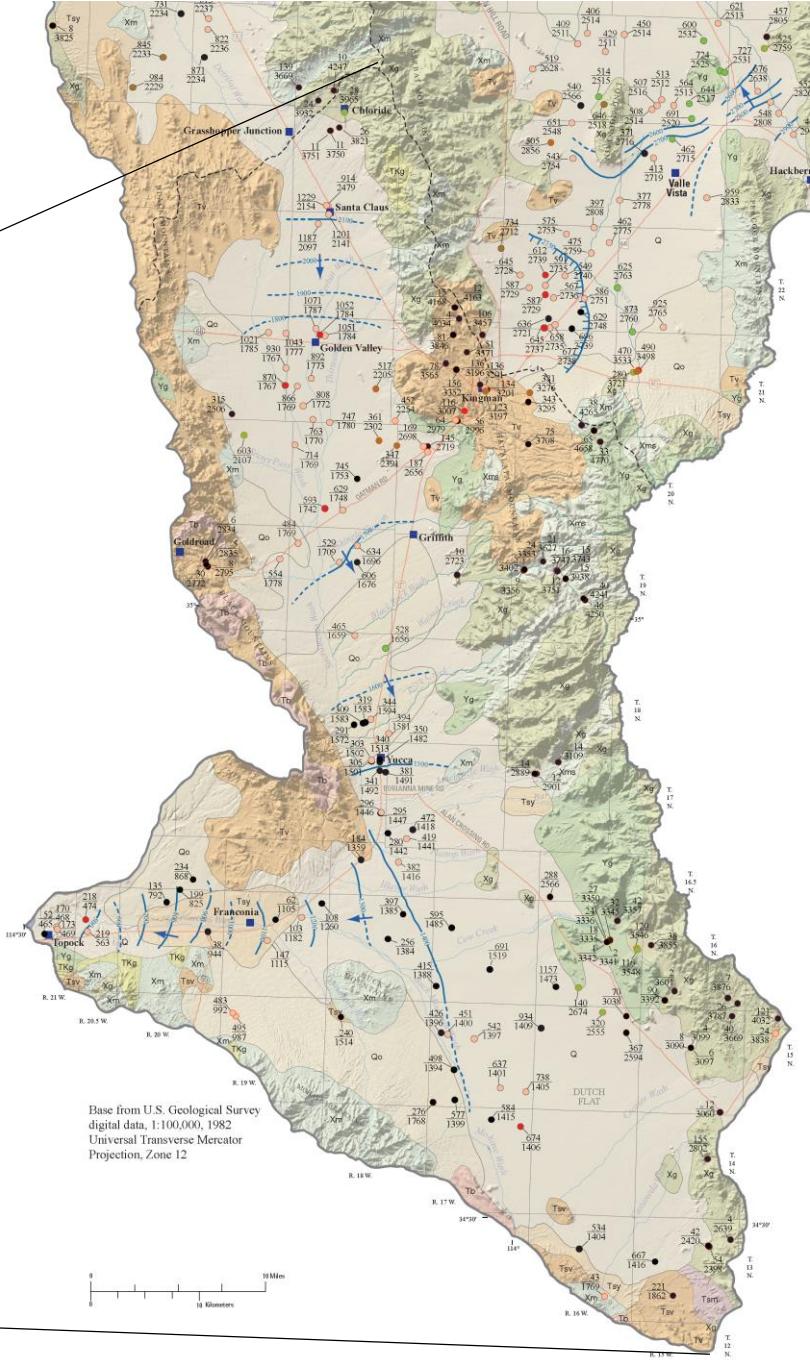
Year	Detrital	Hualapai	Meadview	Sacramento	Year	Detrital	Hualapai	Meadview	Sacramento
1924				1	1979		1		64
1932		3		1	1980		97	9	7
1942				1	1981		4		3
1943		7		69	1982		5	1	6
1944		4		53	1983		3	1	7
1945				9	1984	29	4	1	8
1946				7	1985	3	62	8	8
1947				3	1986	3	10	5	9
1948				7	1987	33	6	1	8
1949				2	1988	4	8	1	11
1950		1		2	1989	4	9	1	11
1951		1		11	1990	13	8	3	181
1952		8		42	1991	4	80	14	21
1953		3		15	1992	15	10	4	16
1954		1		2	1993	5	10	4	16
1955		4		12	1994	5	10	4	12
1956		4		9	1995	31	71	17	66
1957	1	2		5	1996	4	22	7	12
1958		4		4	1997	4	10	4	16
1959				4	1998	4	10	4	14
1960		1		3	1999	9	13	10	26
1961		1		7	2000	4	10	4	17
1962		3		5	2001	4	10	4	16
1963		5		6	2002	4	10	4	15
1964		22		33	2003	5	26	4	13
1965	1	33		41	2004	4	13	6	20
1966	1	5		11	2005	7	16	5	15
1967	2	4		8	2006	118	128	23	225
1968		4		9	2007	17	30	5	21
1969		7		11	2008	15	26	6	16
1970		3		6	2009	13	23	3	23
1971		5		9	2010	11	15	3	21
1972		4		7	2011	16	25	4	23
1973		3	6	7	2012	14	25	4	26
1974		2	2	6	2013	13	28	4	26
1975	1	1	1	6	2014	16	32	5	29
1976		2	1	6	2015	13	27	3	23
1977				9					
1978		2		15	Total	450	1046	196	1515

# Northwest Basins Water Level Change (2006 - 2015)



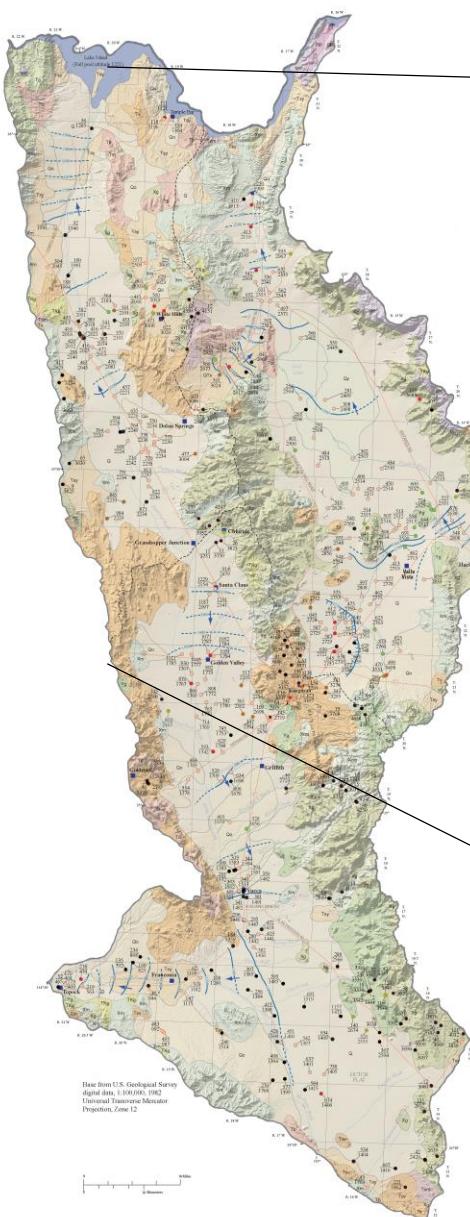


## 2006 Sacramento Valley Groundwater Conditions

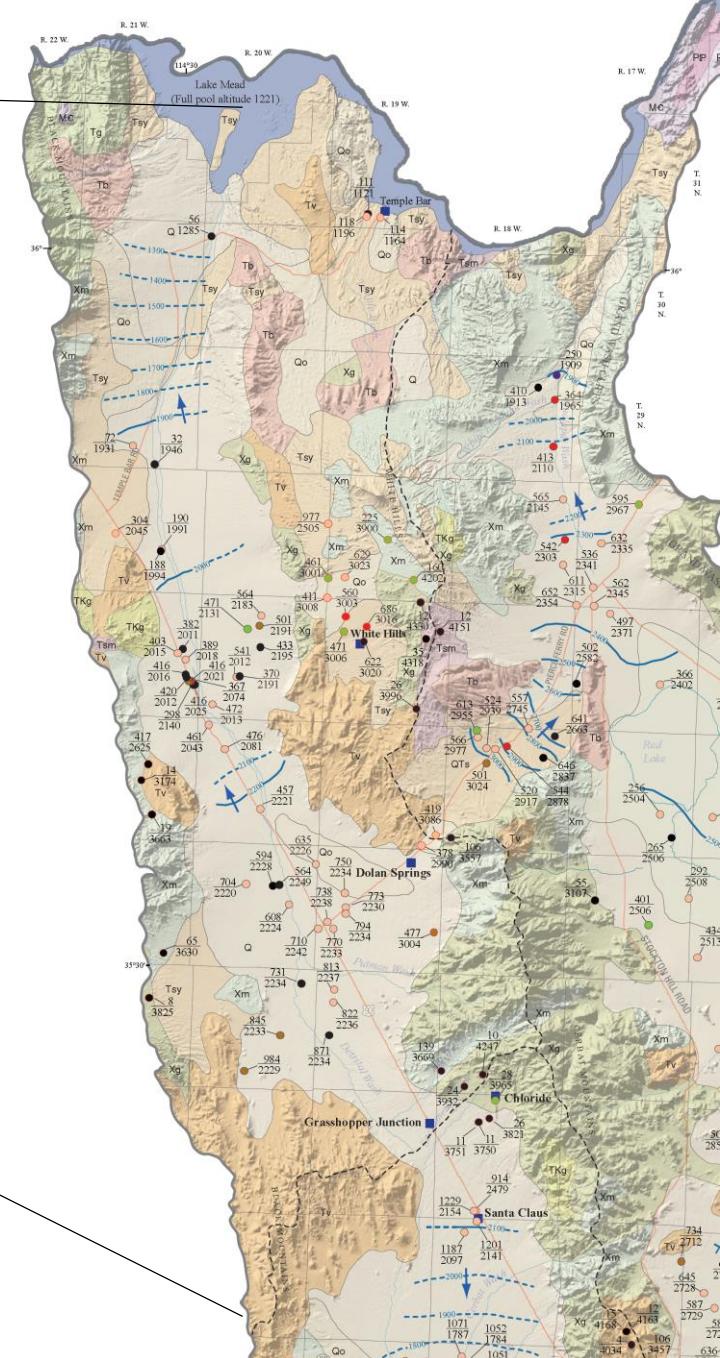


DEPTH TO WATER AND WATER-LEVEL ALTITUDE IN 2006 FOR SELECTED WELLS, DETRITAL, HUALAPAI,  
AND SACRAMENTO VALLEY BASINS, MOHAVE COUNTY, ARIZONA

By  
David W. Anning, Margot Truni, Marilyn E. Flynn, and William H. Remick

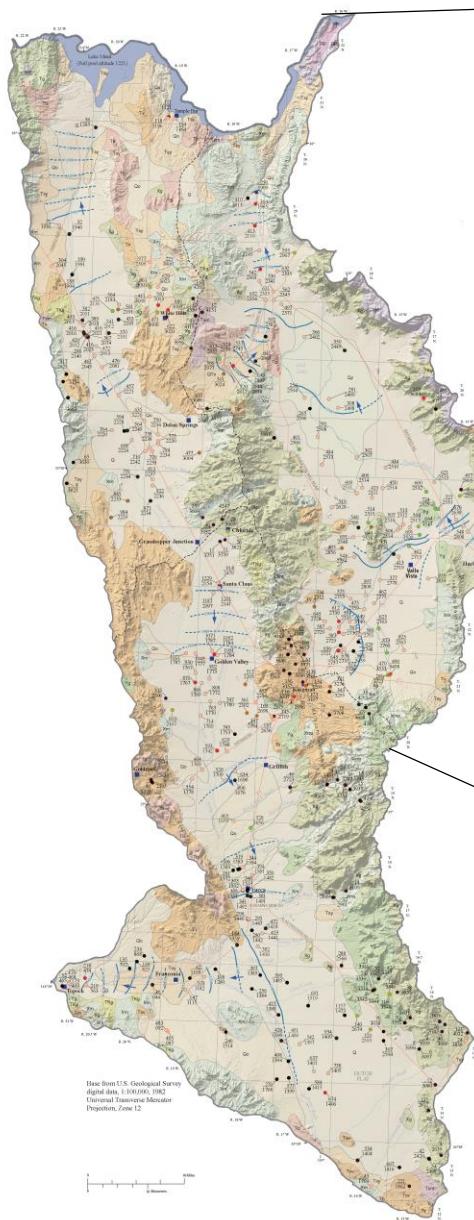


# 2006 Detrital Valley Groundwater Conditions

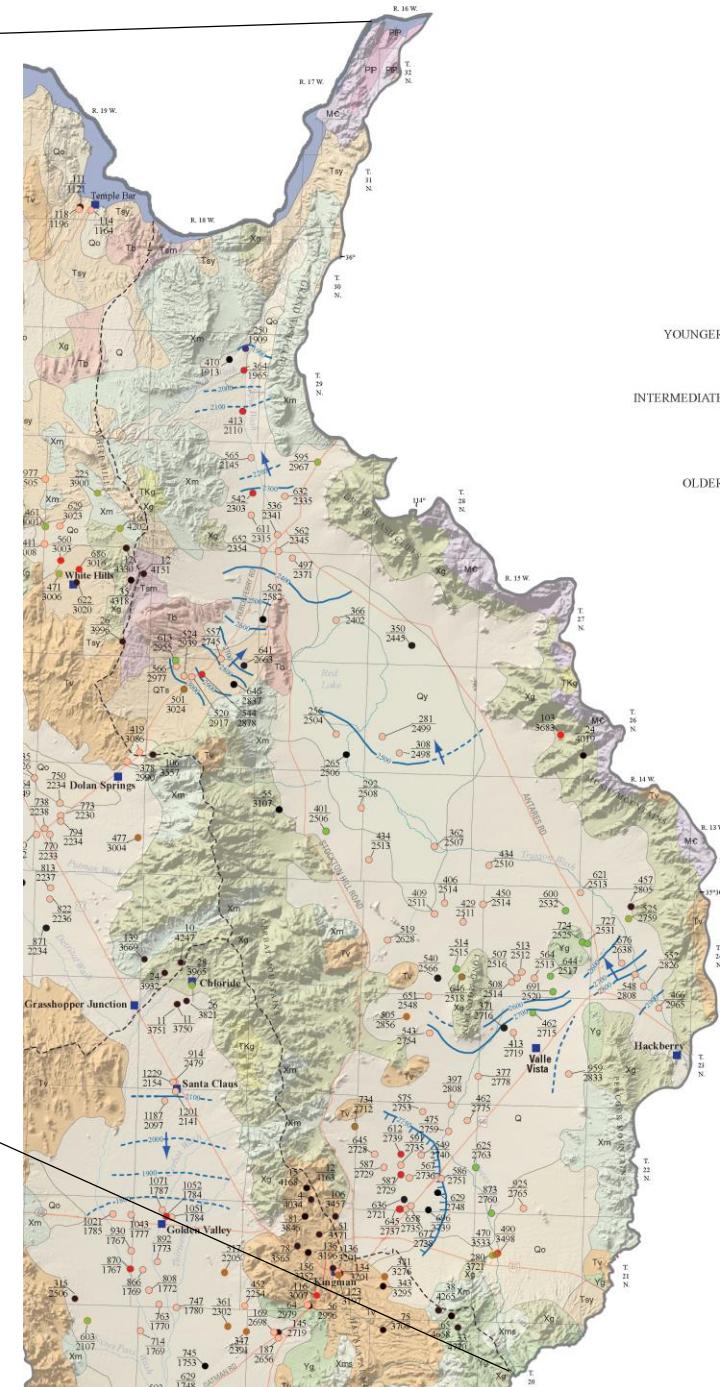


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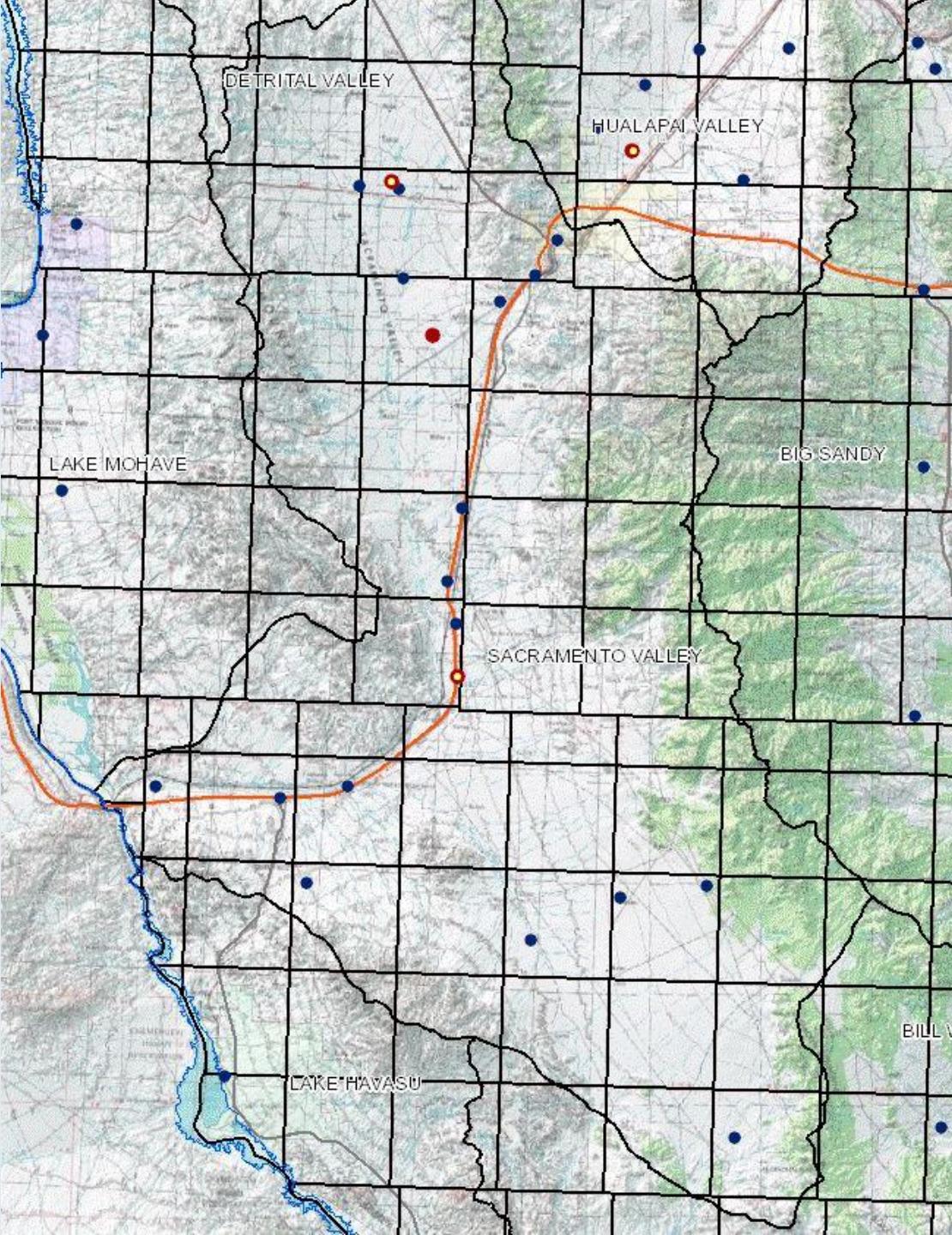
# 2006 Hualapai Valley Groundwater Conditions

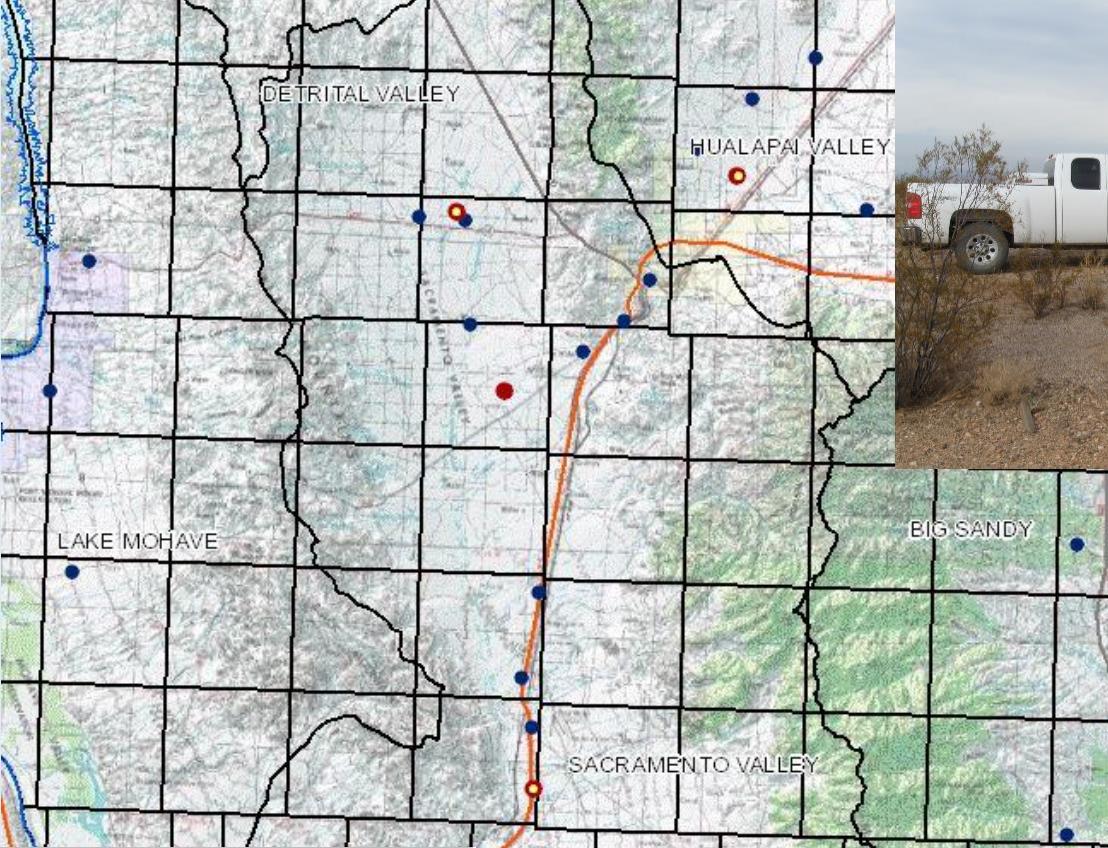


DEPTH TO WATER AND WATER-LEVEL ALTITUDE IN 2006 FOR SELECTED WELLS, DETRITAL, HUALAPAI,  
AND SACRAMENTO VALLEY BASINS, MOHAVE COUNTY, ARIZONA

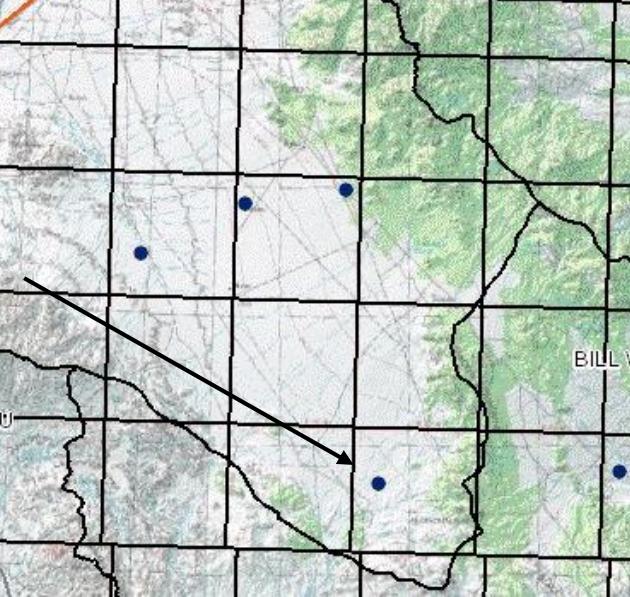
By  
David W. Anning, Margot Truini, Marilyn E. Flynn, and William H. Remick

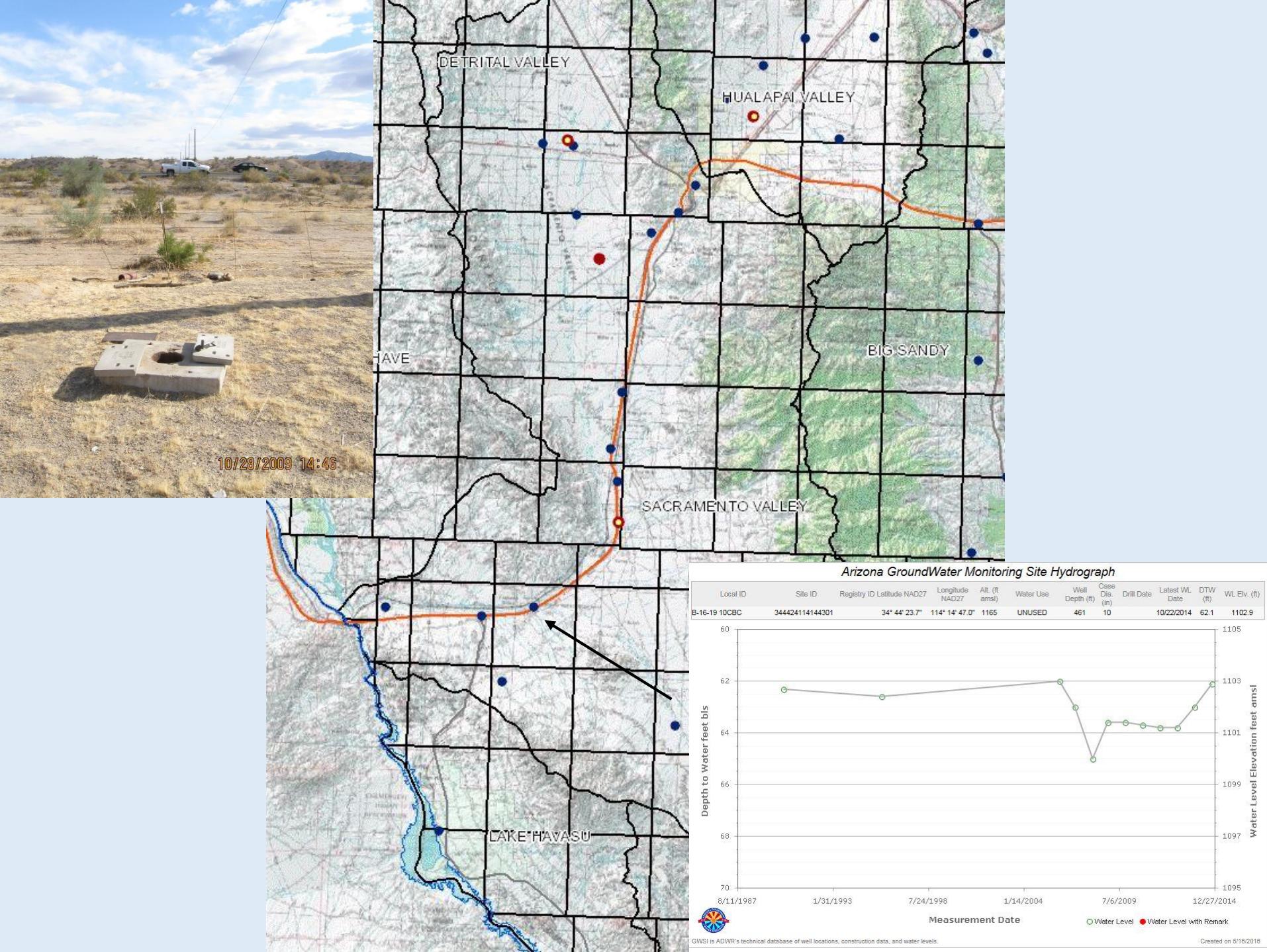
# Sacramento Valley Basin

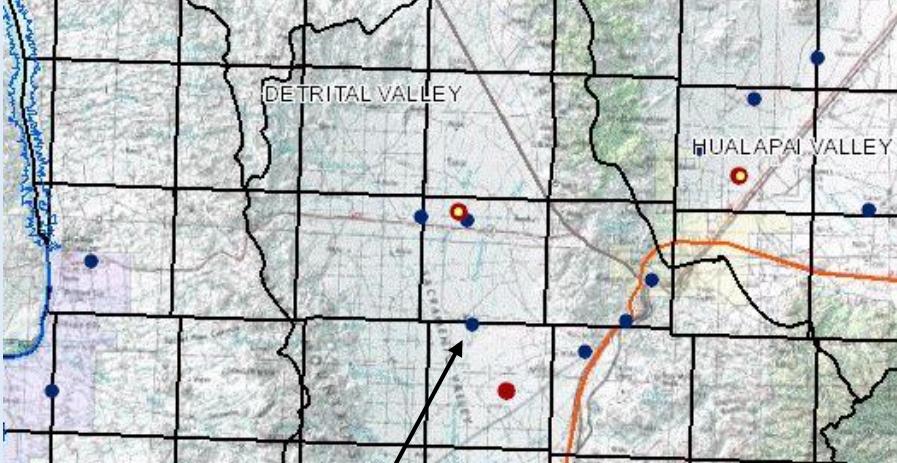


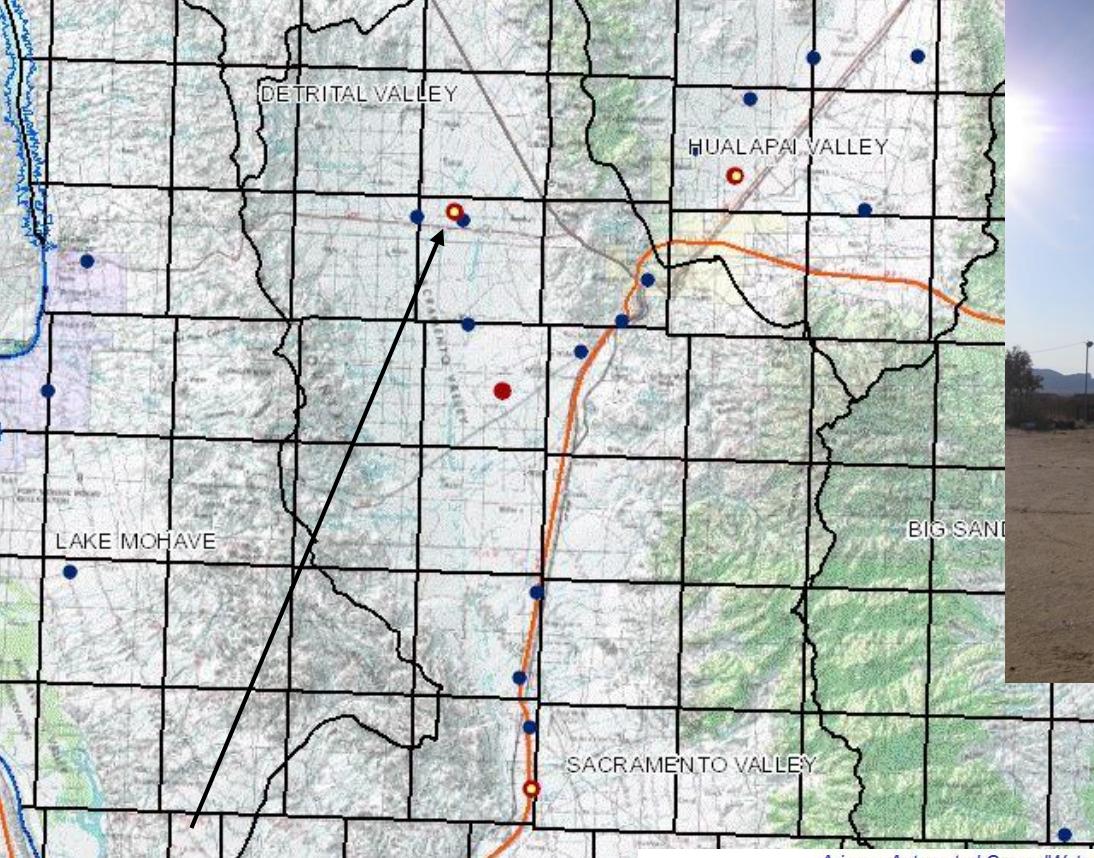


10/27/2009 15:26







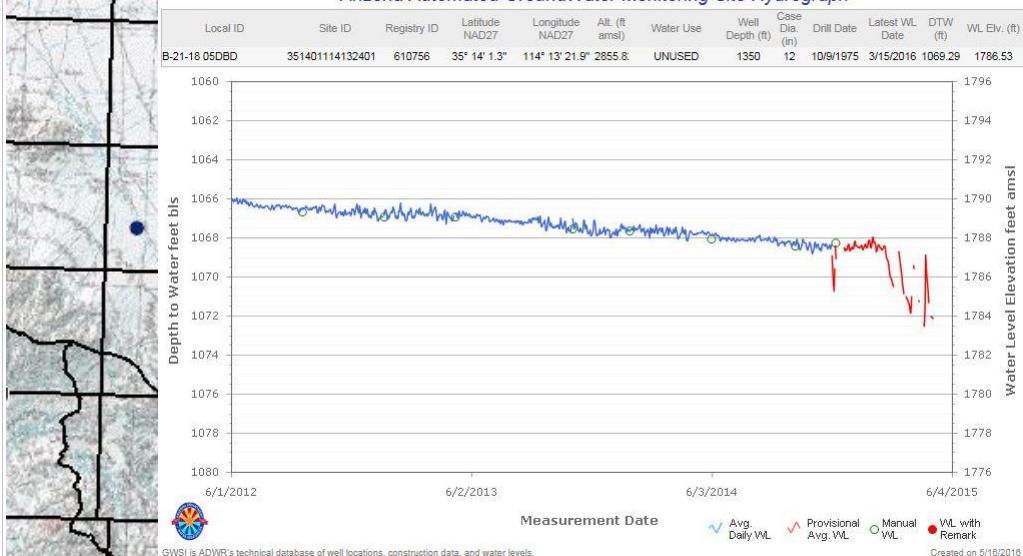


**Arizona GroundWater Monitoring Site Hydrograph**

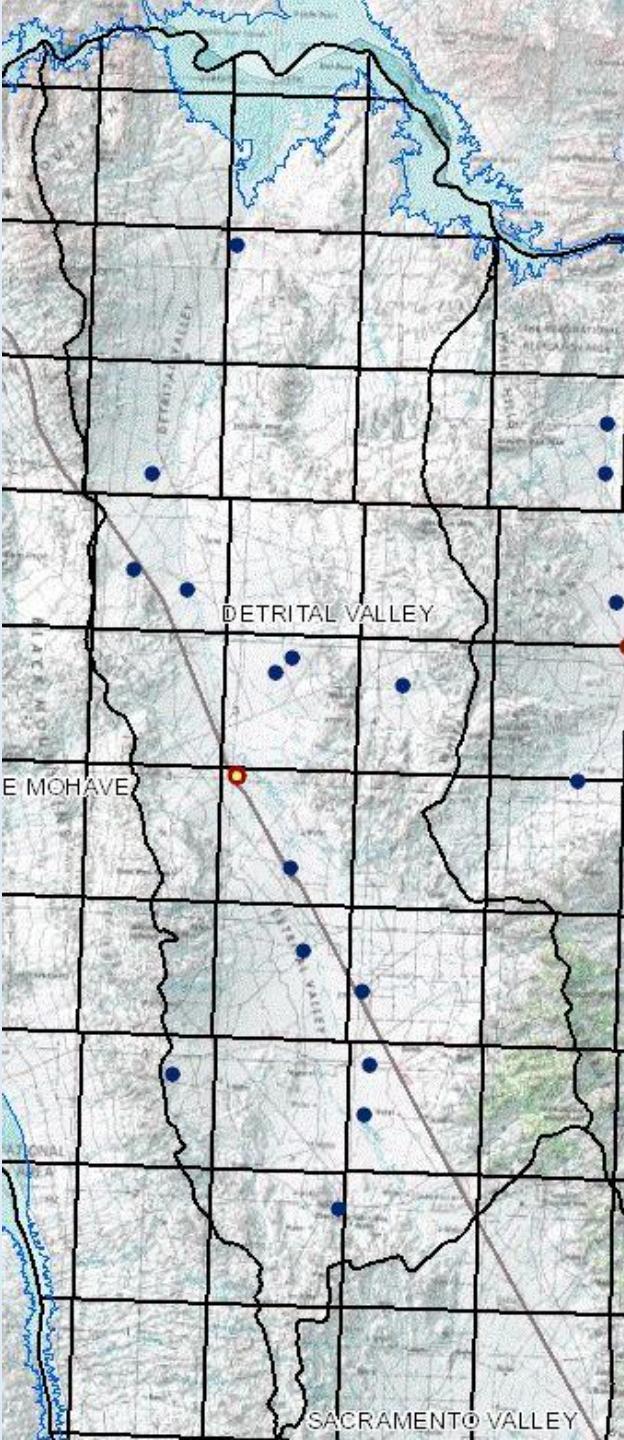
Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in)	Drill Date	Latest WL Date	DTW (ft)	WL Elev. (ft)
B-21-18-05DBD	351401114132401	610756	35° 14' 1.3"	114° 13' 21.9"	2855.8	UNUSED	1350	12	10/9/1975	3/15/2016	1069.29	1786.53

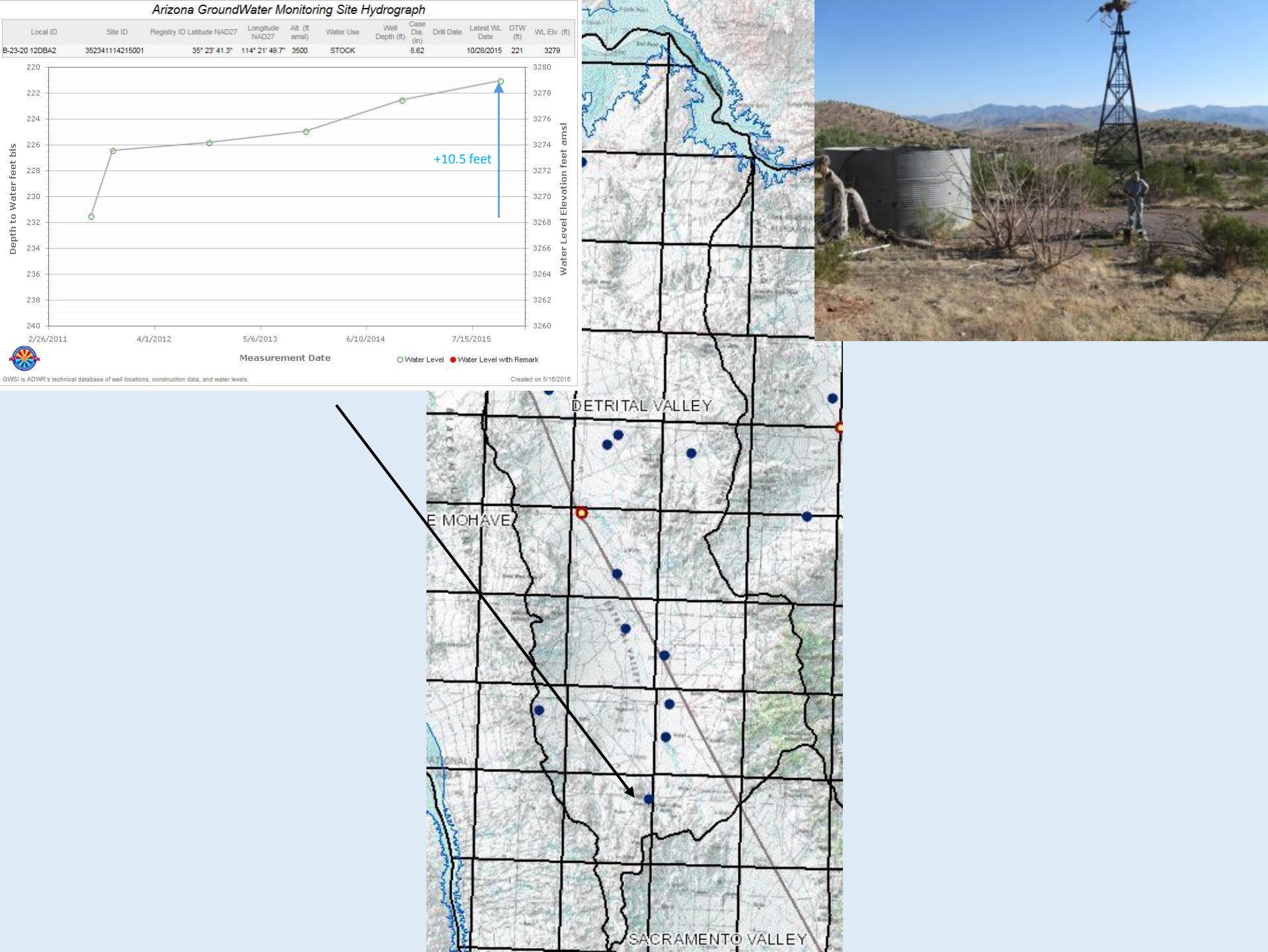


**Arizona Automated GroundWater Monitoring Site Hydrograph**



## Detrital Valley





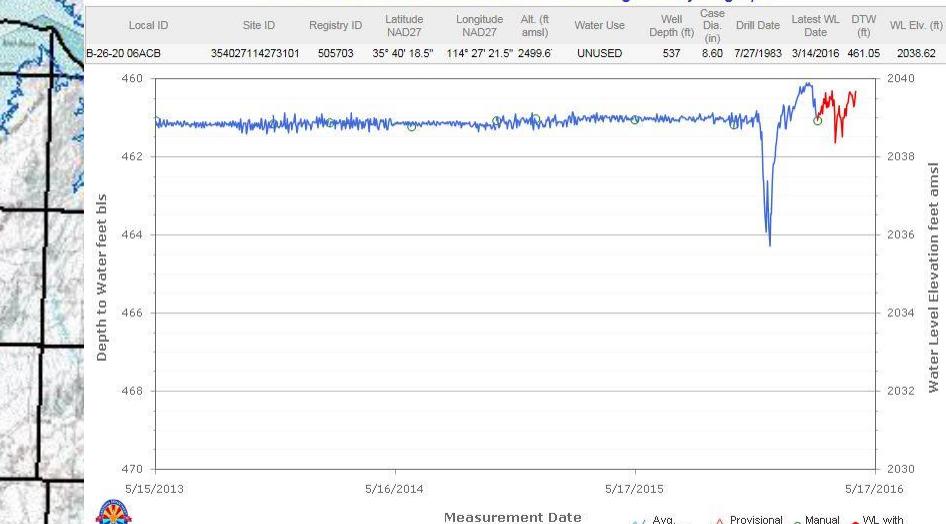
### Arizona GroundWater Monitoring Site Hydrograph



GWSI is ADWR's technical database of well locations, construction data, and water levels.

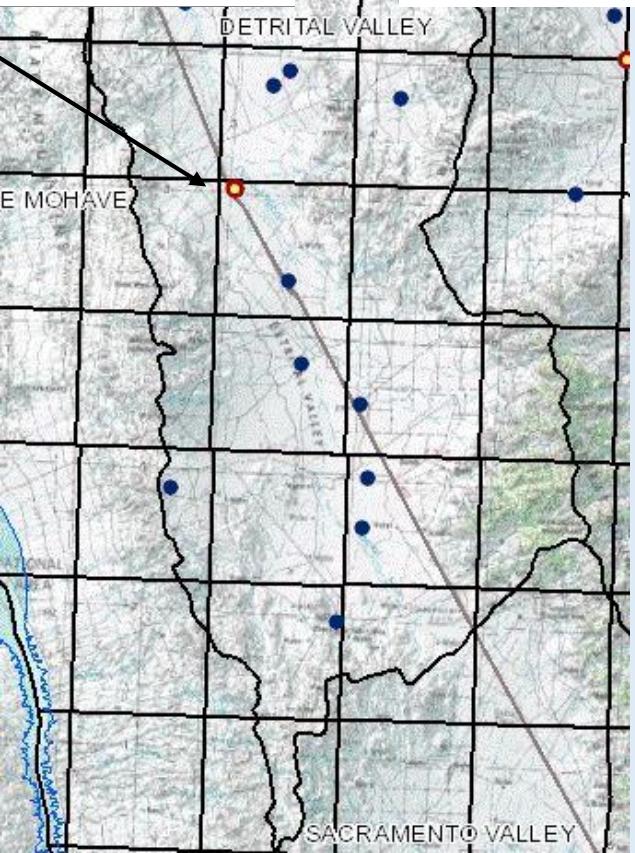
Created on 5/10/2016

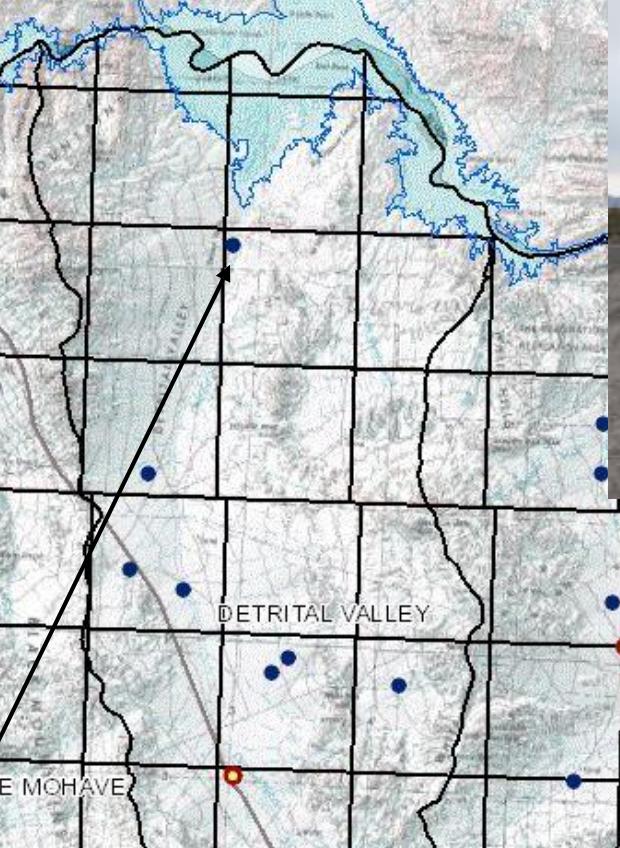
### Arizona Automated GroundWater Monitoring Site Hydrograph



GWSI is ADWR's technical database of well locations, construction data, and water levels.

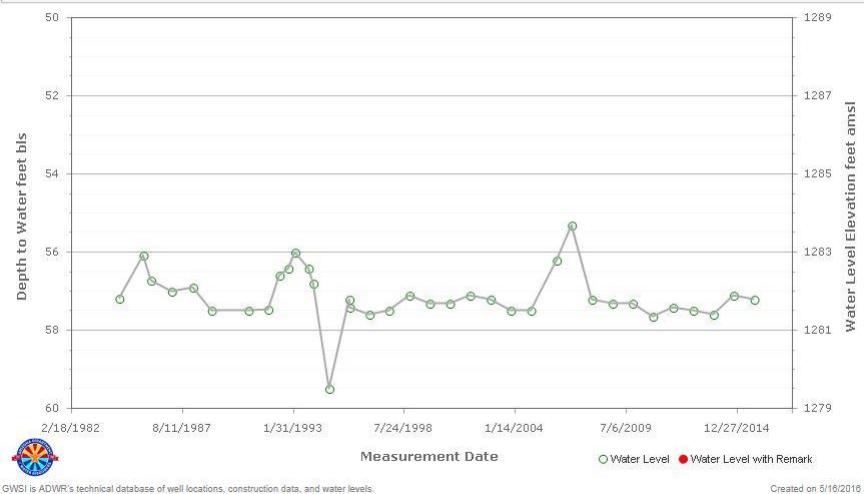
Created on 5/10/2016



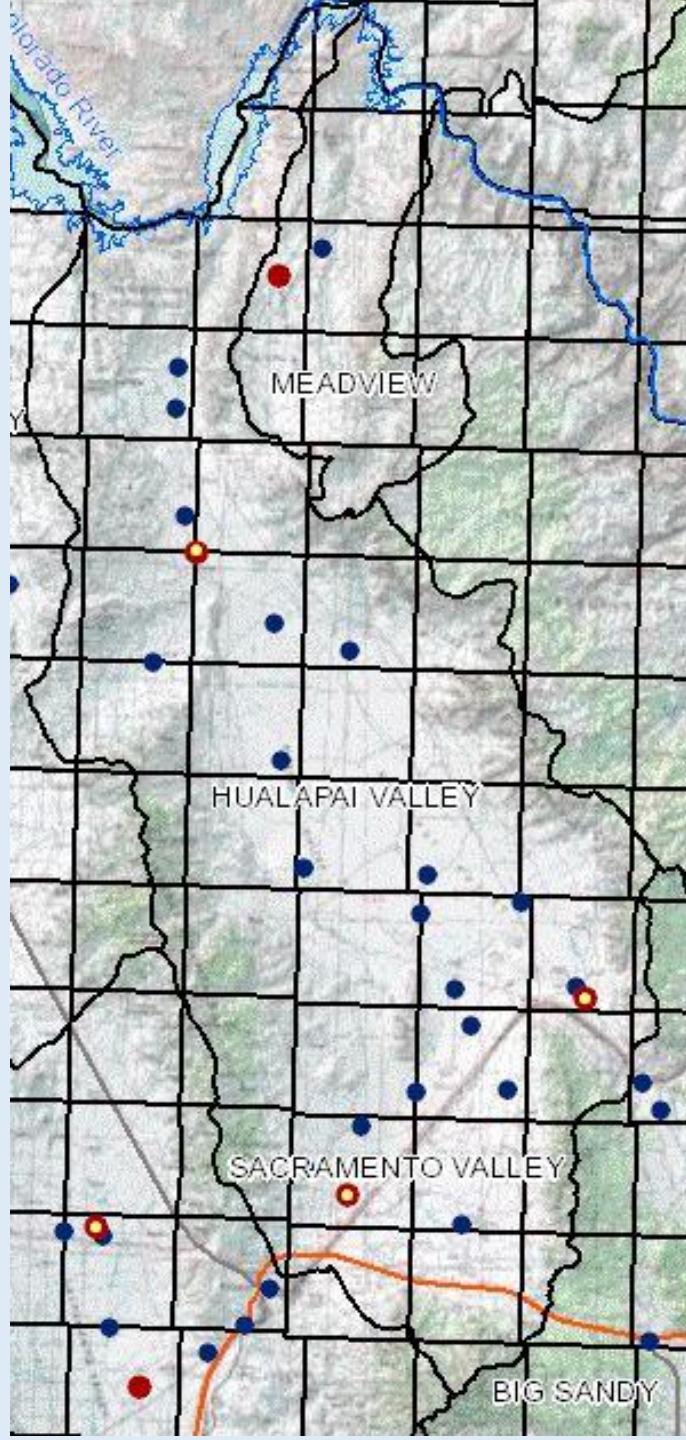


*Arizona GroundWater Monitoring Site Hydrograph*

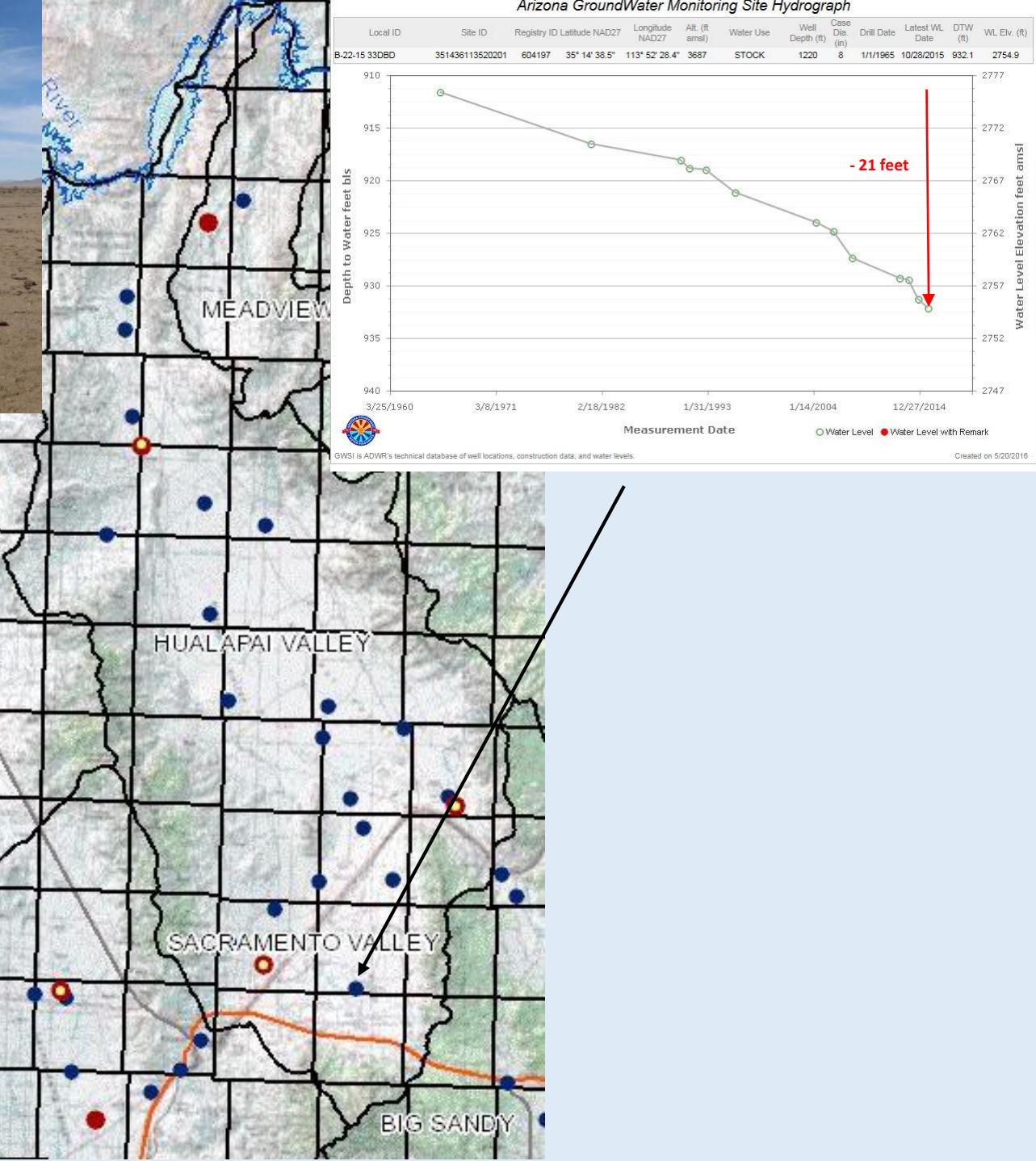
Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in.)	Drill Date	Latest WL Date	DTW (ft)	WL Elv. (ft)
B-30-20 06CAD UNSURV/360105114281101	629128	36° 0' 53.4"	114° 26' 12.8"	1339	UNUSED	185	8	1/1/1957	10/28/2015	57.2	1281.8	



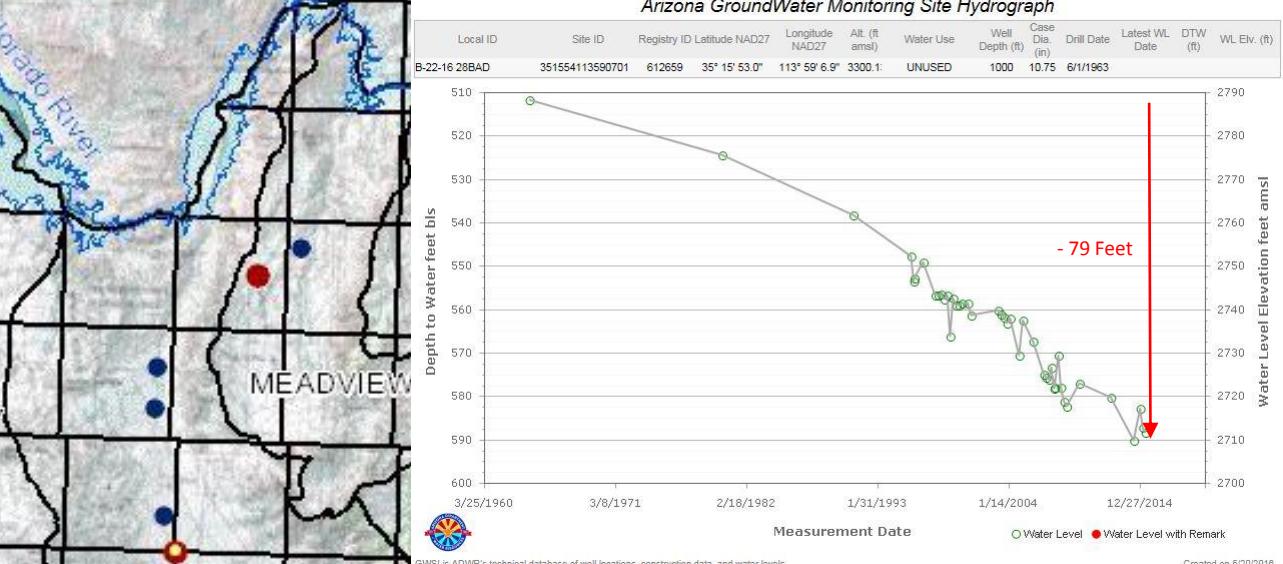
## Hualapai Valley Basin



## Arizona GroundWater Monitoring Site Hydrograph

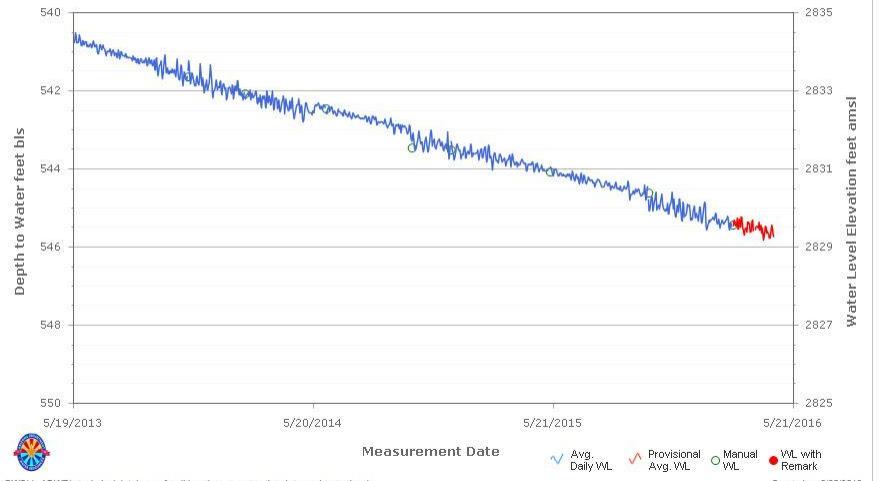


## Arizona GroundWater Monitoring Site Hydrograph



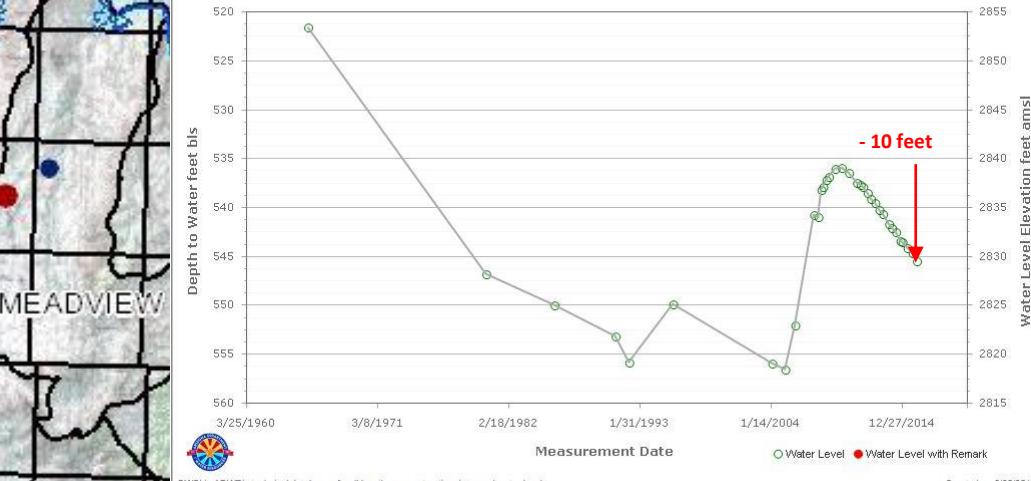
### Arizona Automated GroundWater Monitoring Site Hydrograph

Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in)	Drill Date	Latest WL Date	DTW (ft)	WL Elv. (ft)
B-24-14 33ADA	352518113454001		35° 25' 26.1"	113° 45' 49.5"	3374.8	UNUSED	623	16	1/1/1944	3/14/2016	545.42	2829.43

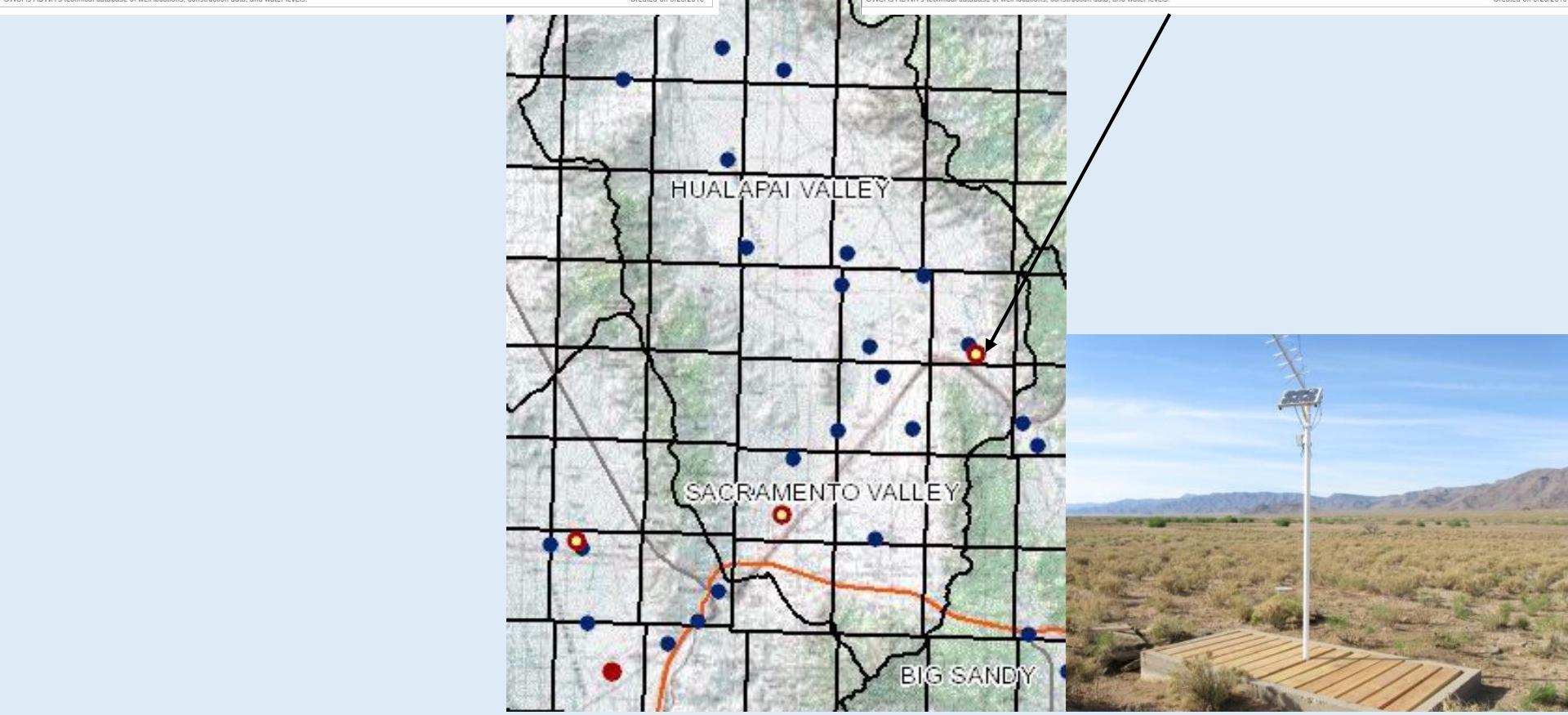


### Arizona GroundWater Monitoring Site Hydrograph

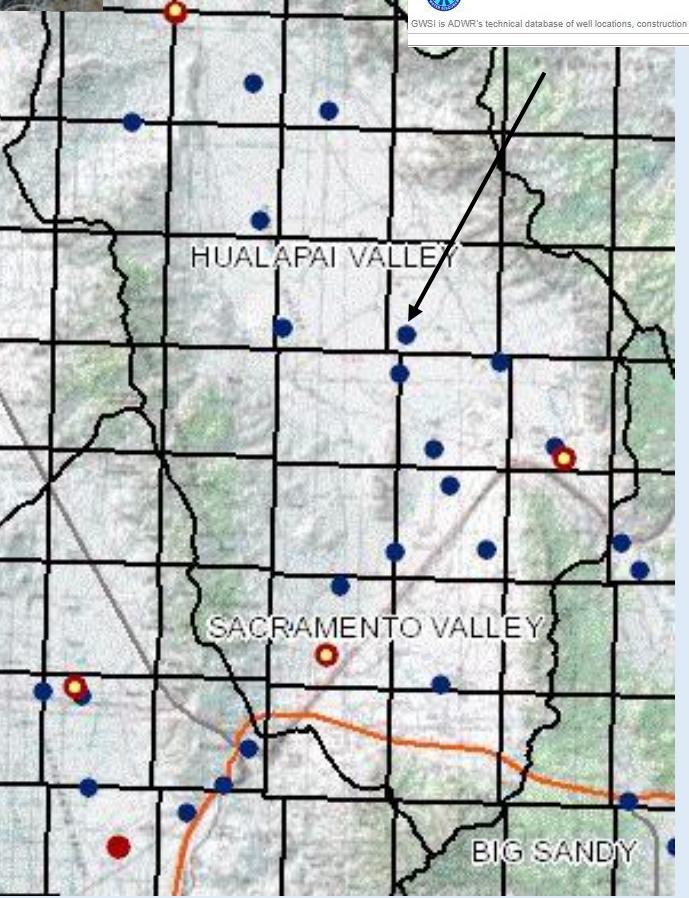
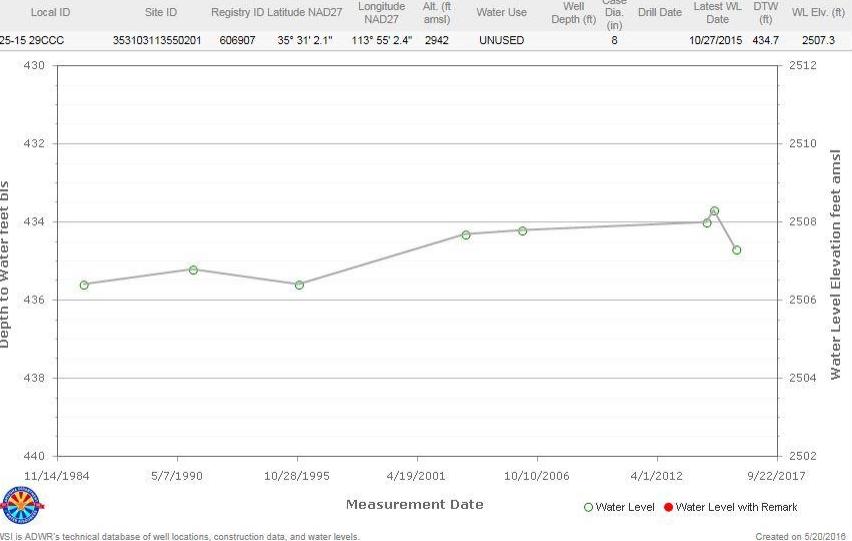
Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in)	Drill Date	Latest WL Date	DTW (ft)	WL Elv. (ft)
B-24-14 33ADA	352518113454001		35° 25' 26.1"	113° 45' 49.5"	3374.8	UNUSED	623	16	1/1/1944	3/14/2016	545.42	2829.43

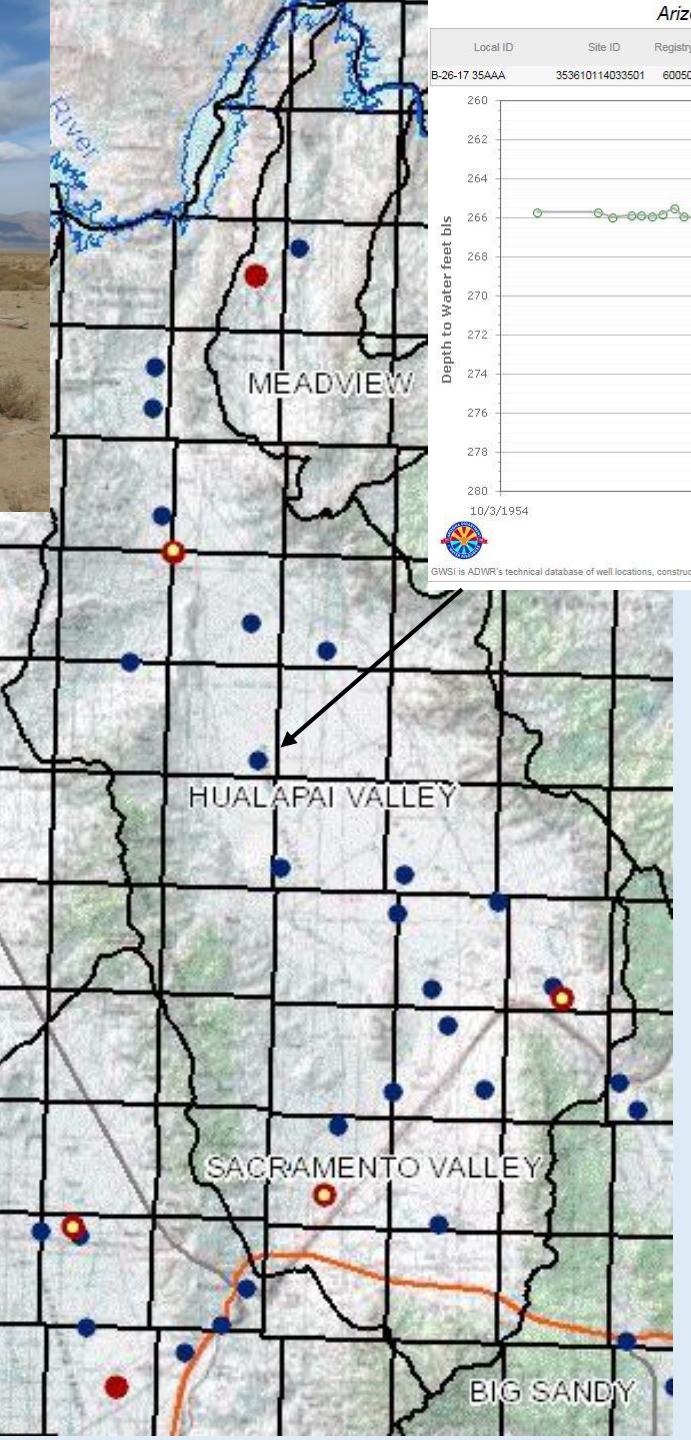


GWSI is ADWR's technical database of well locations, construction data, and water levels.



## Arizona GroundWater Monitoring Site Hydrograph

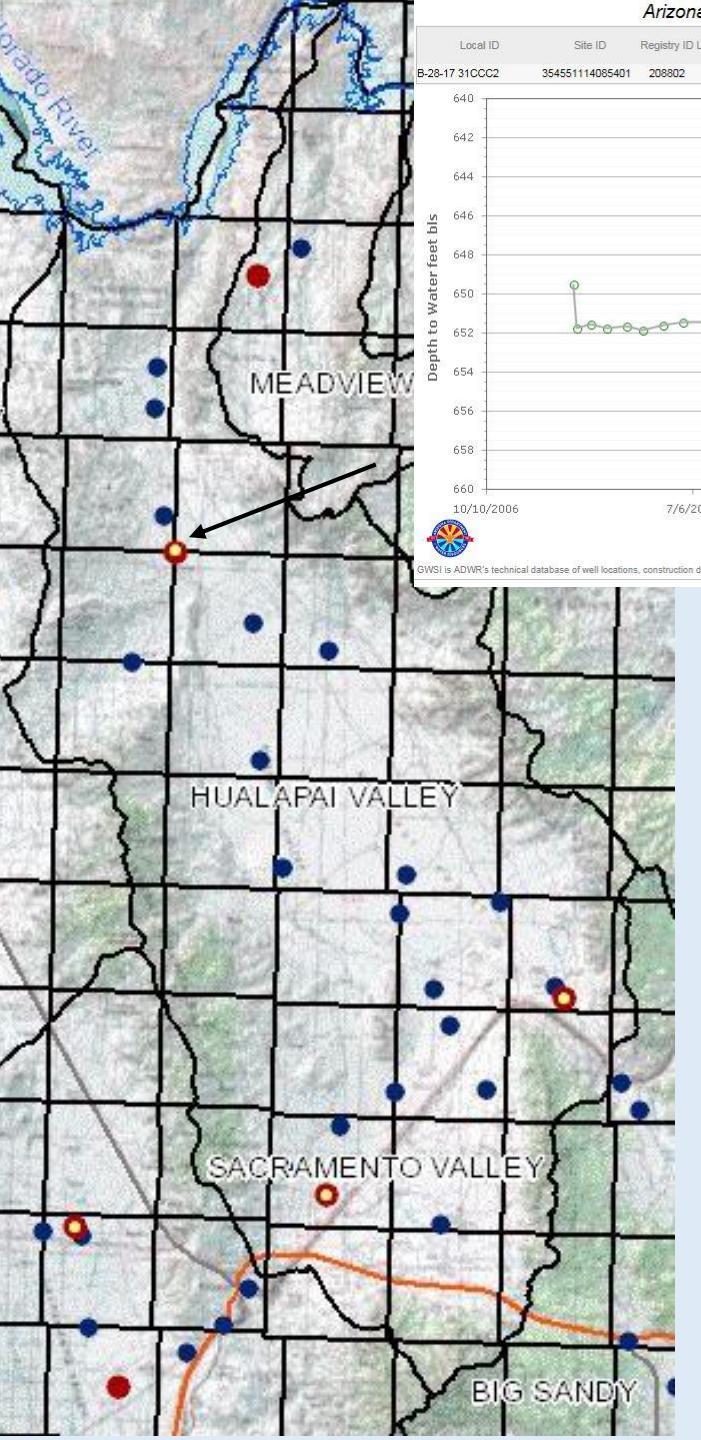




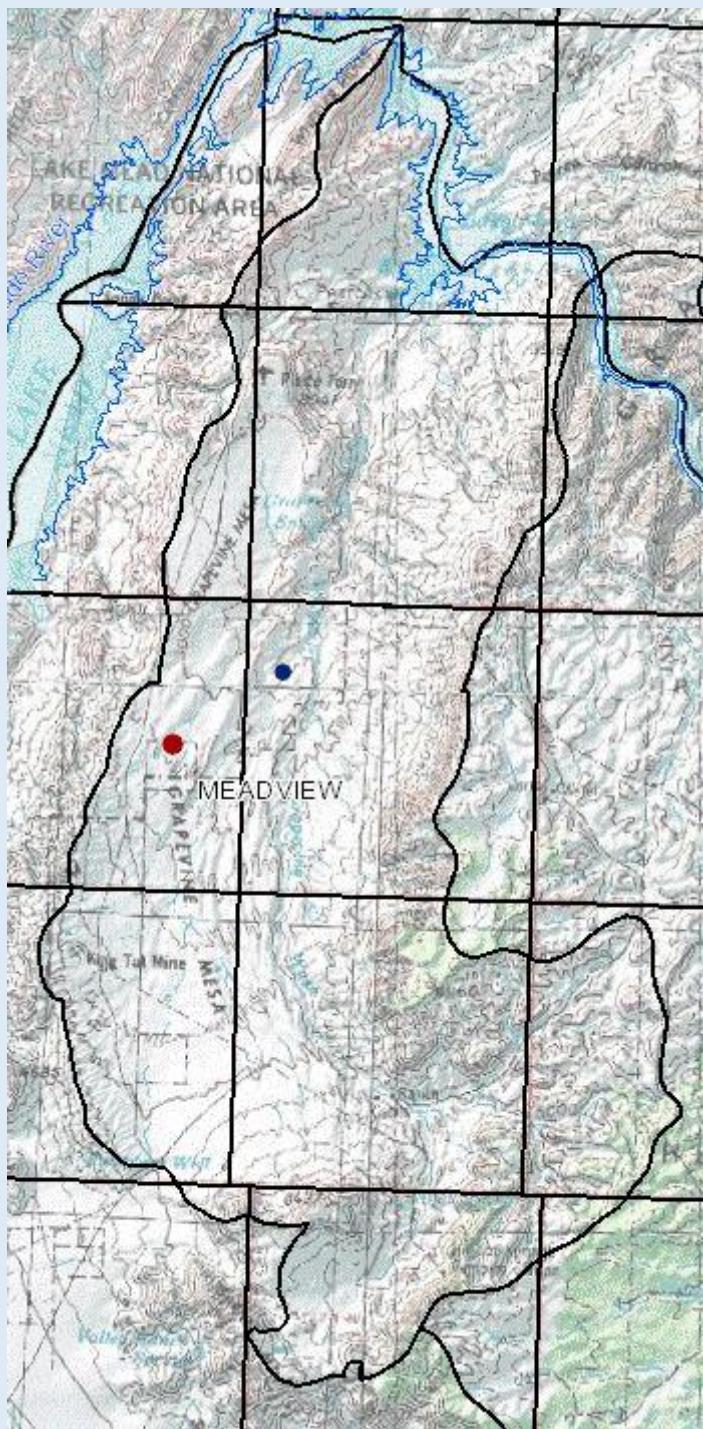
Arizona GroundWater Monitoring Site Hydrograph

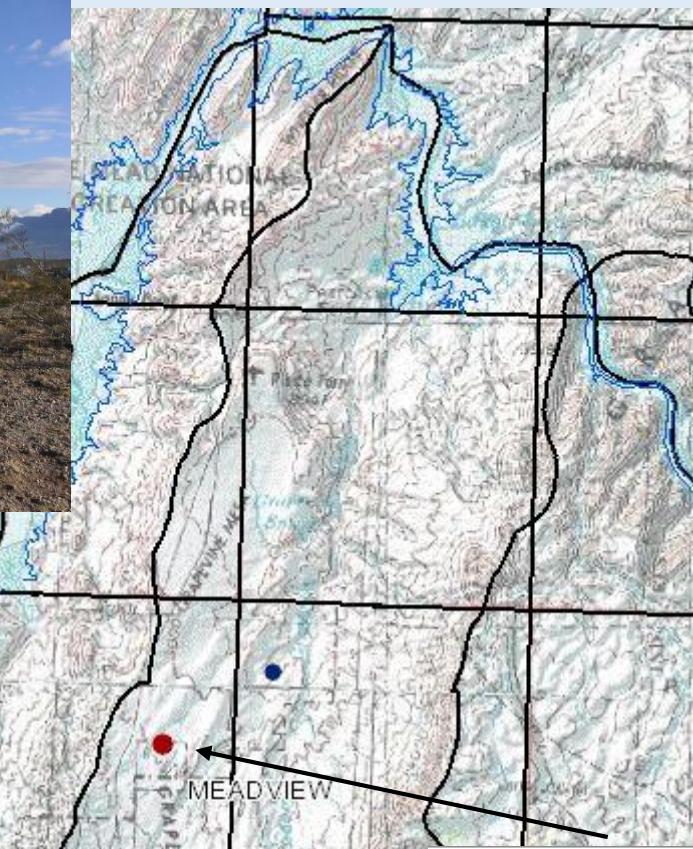
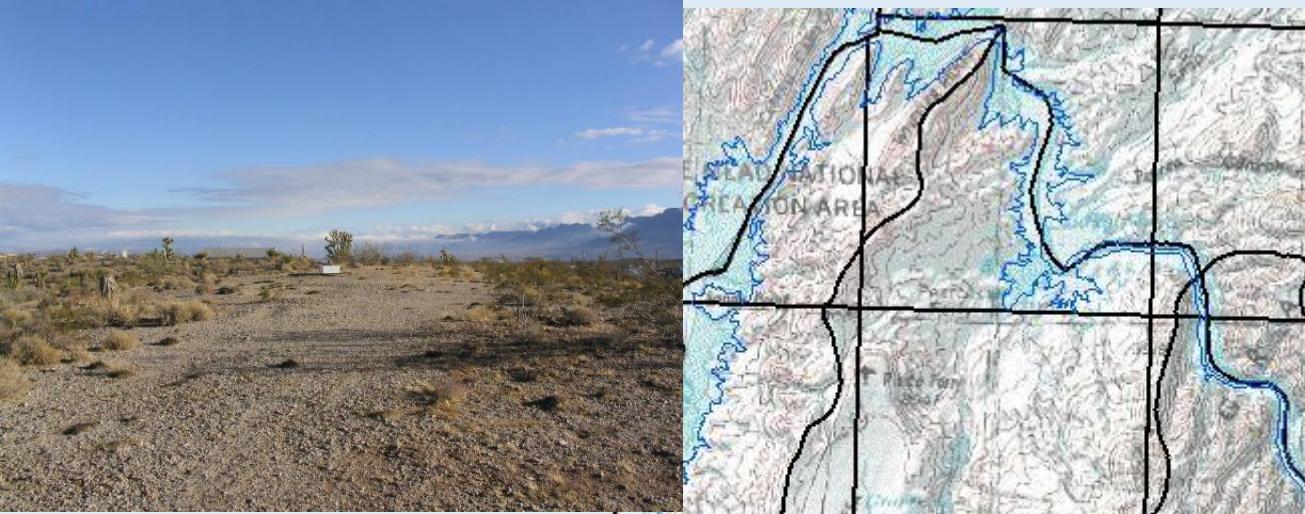


- 9 feet



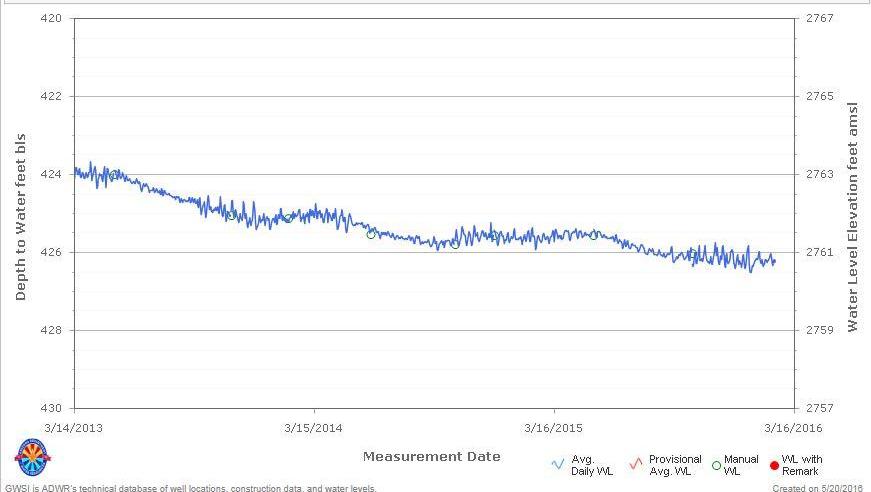
## Meadview Basin





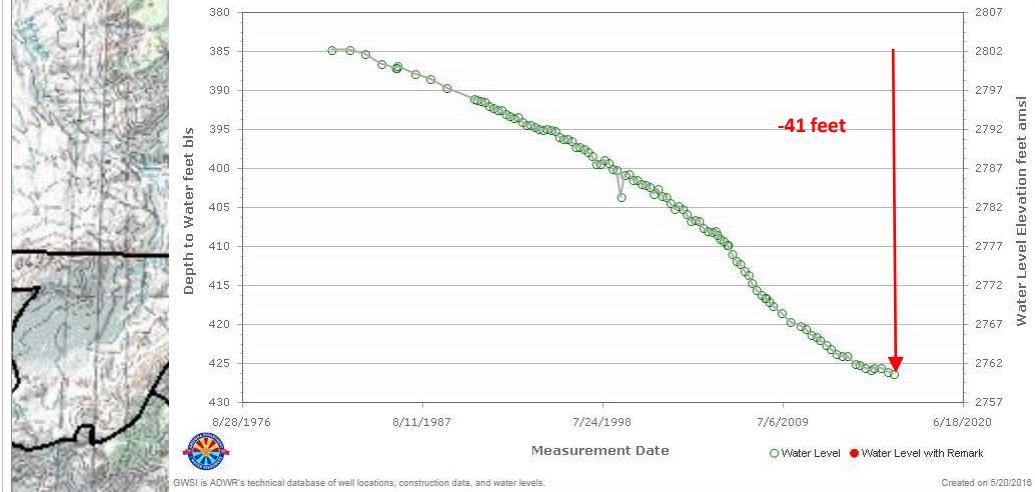
Arizona Automated GroundWater Monitoring Site Hydrograph

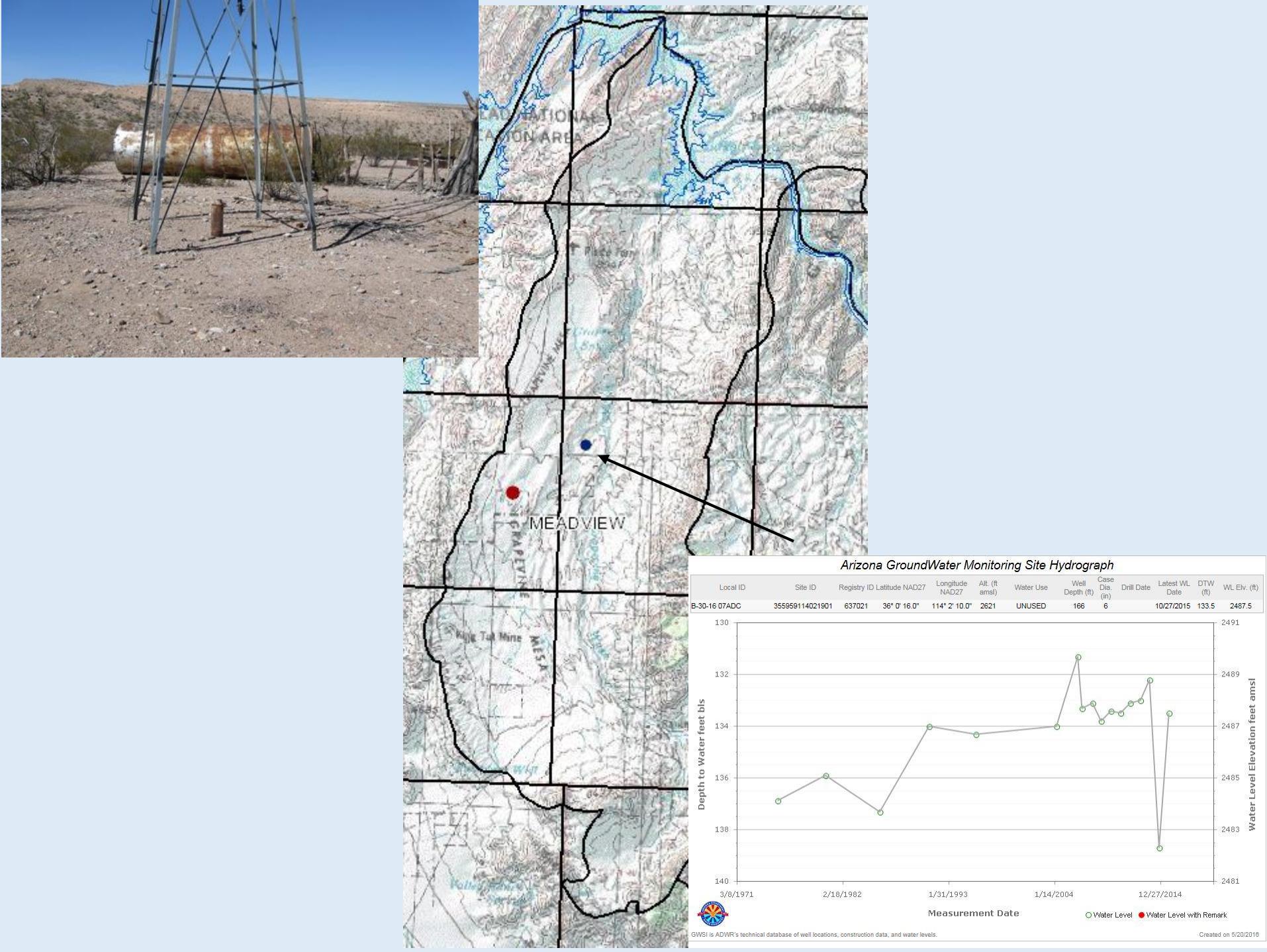
Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in)	Drill Date	Latest WL Date	DTW (ft)	WL Elv. (ft)
B-30-17 14DCC	355855114043501	610730	35° 58' 55.2"	114° 4' 33.9"	3187.0	UNUSED	650	8	11/6/1973	3/14/2016	426.25	2760.79



Arizona GroundWater Monitoring Site Hydrograph

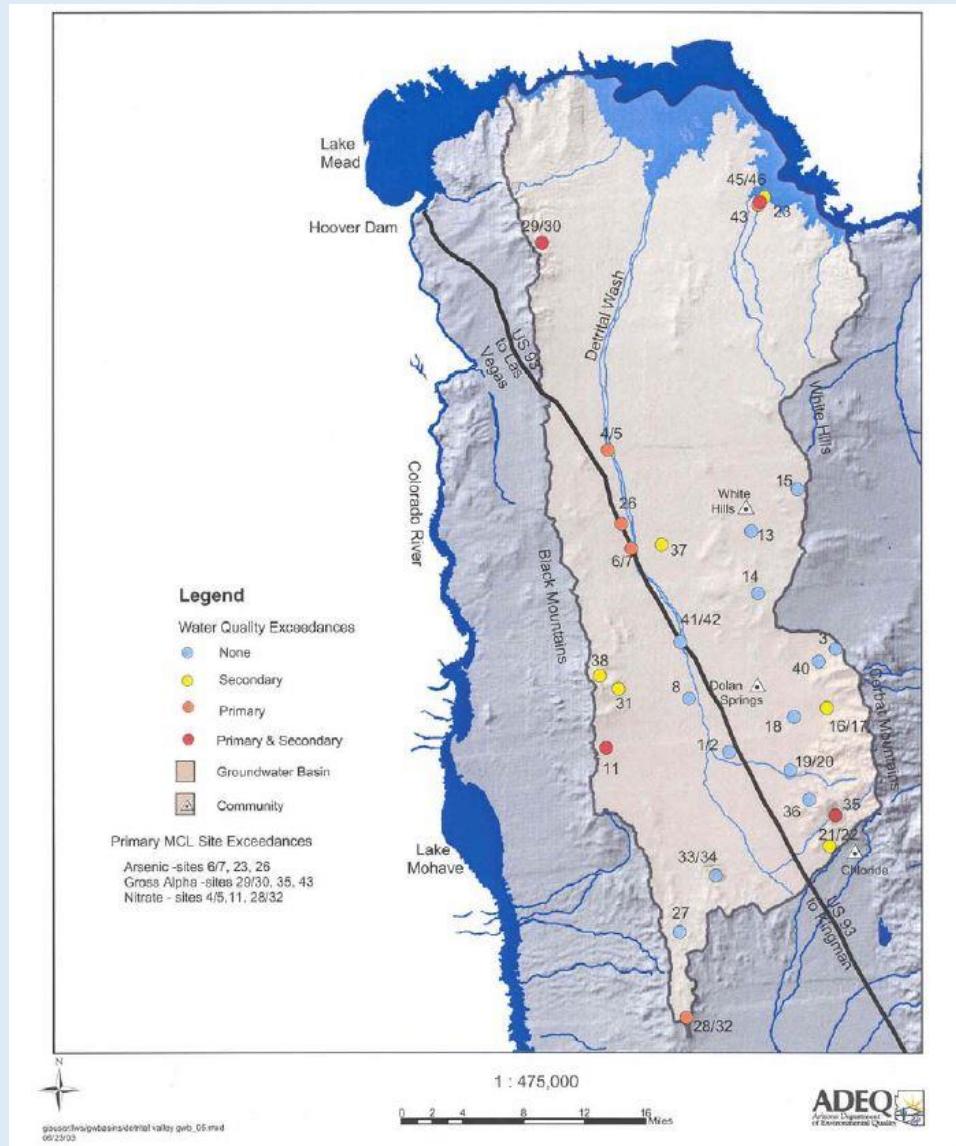
Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in)	Drill Date	Latest WL Date	DTW (ft)	WL Elv. (ft)
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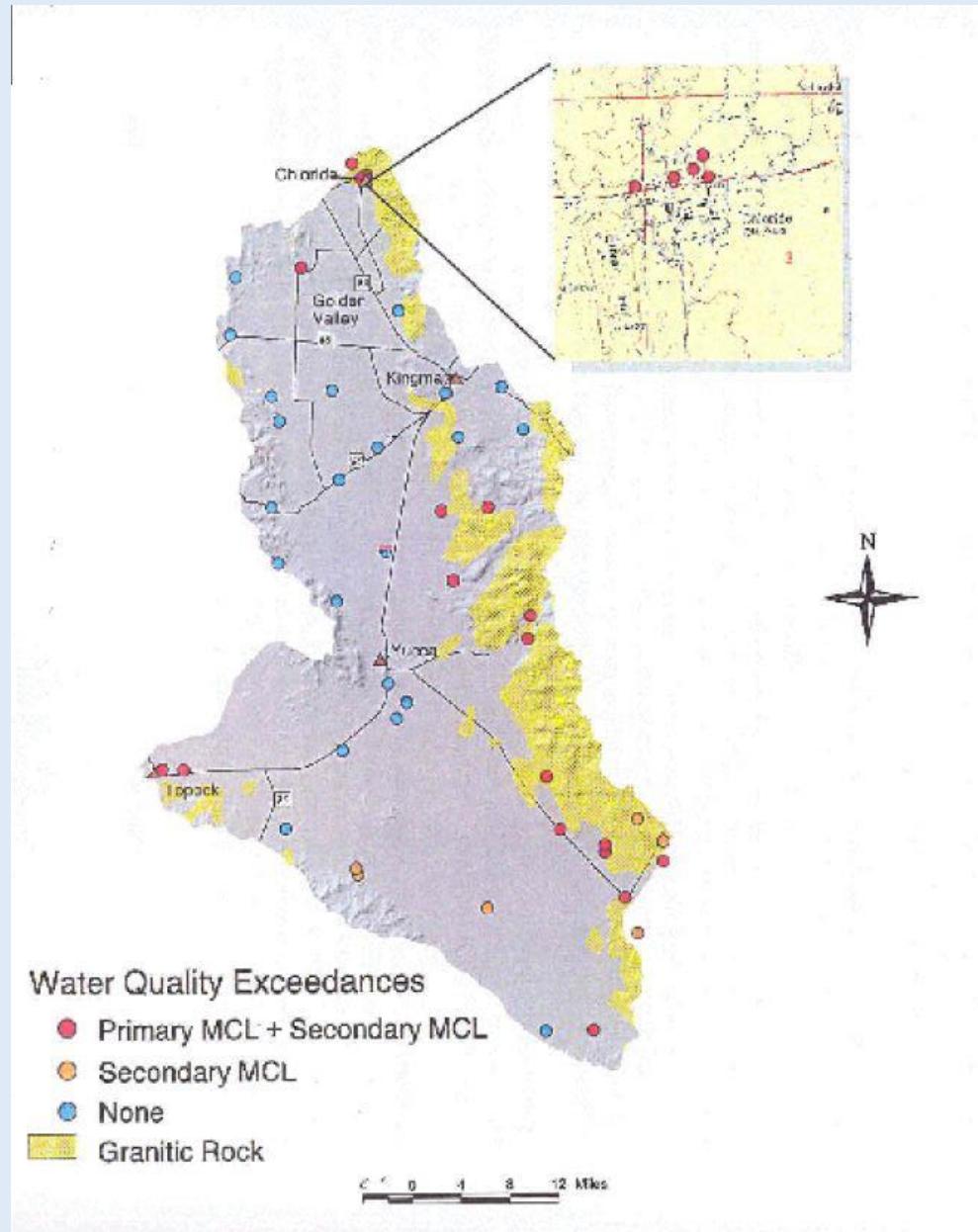


# Water Quality In The Northwest Basins

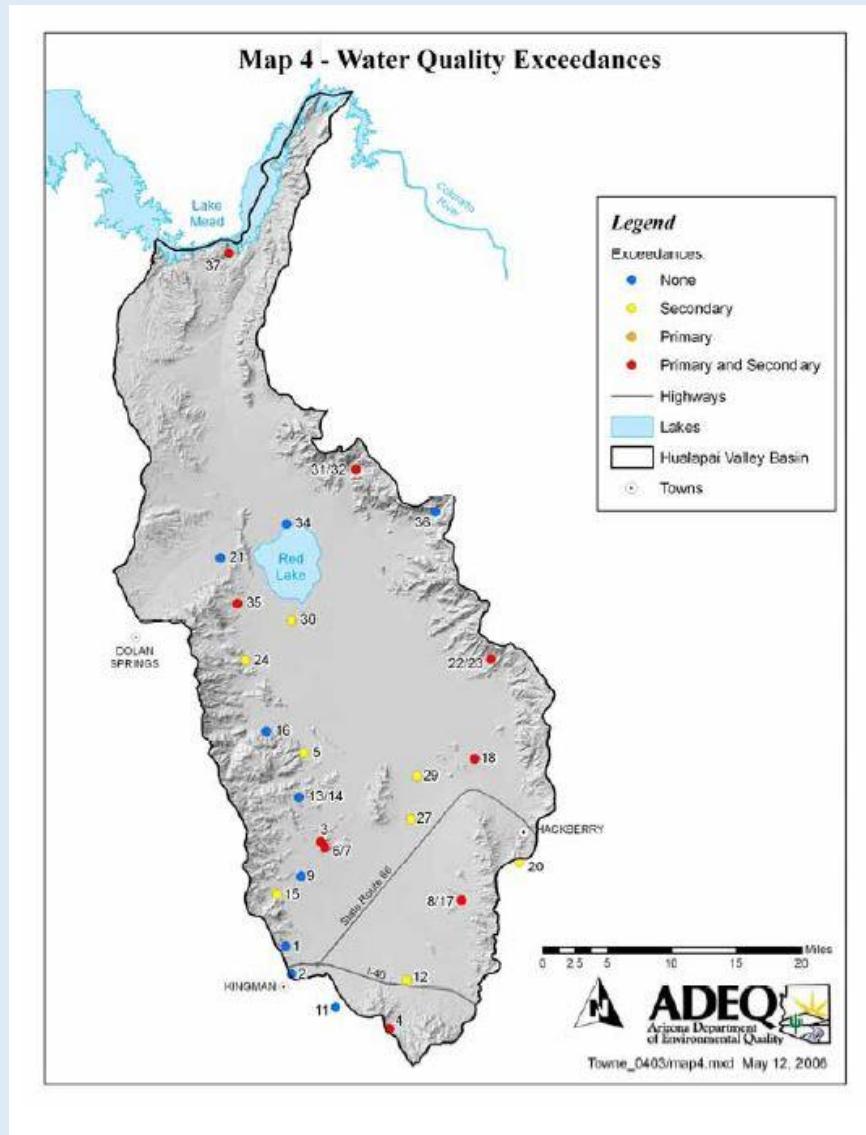
# Water Quality Exceedances In The Detrital Valley Basin (2002)



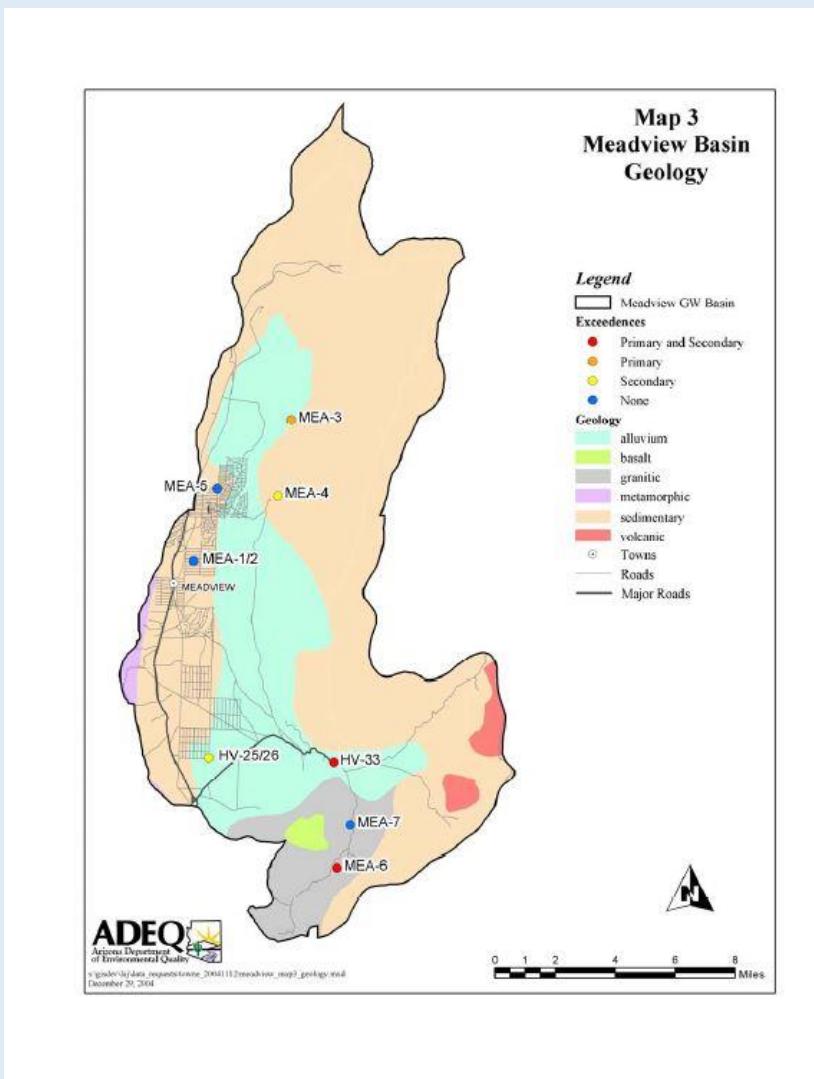
## Water Quality Exceedances In The Sacramento Valley Basin (1999)



# Ambient Water Quality Exceedances In The Hualapai Valley Basin (2000)



# Ambient Water Quality Exceedances In The Meadview Basin (2000 - 2003)



# Hydrologic Map Series Reports

HMS No. 4  
HMS No. 14  
HMS No. 21

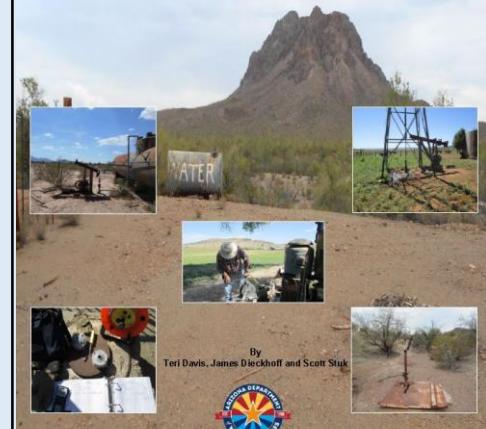
ADWR Northwest Basin Hydrology Reports Can be Downloaded at:

<http://www.azwater.gov/AzDWR/Hydrology/Library/Library.htm>

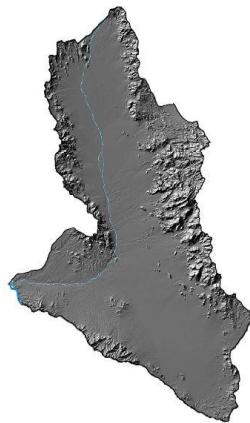
ARIZONA DEPARTMENT OF WATER RESOURCES  
Hydrology Division / Field Services Section

STATEWIDE GROUNDWATER LEVEL CHANGES IN ARIZONA  
WATER YEARS 1993 TO 2013, 2003 TO 2013, AND 2012 TO 2013

OPEN FILE REPORT NO.13  
July 2014



Arizona Department of Water Resources  
Hydrology Division



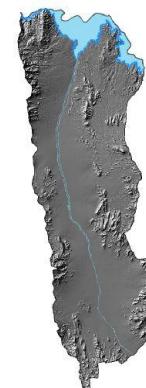
Preliminary Estimate of Groundwater in Storage for the  
Sacramento Valley Groundwater Basin,  
Mohave County, Arizona

Open-File Report Number 10

March 2008

By Brian D. Conway and Paul A. Ivanich

Arizona Department of Water Resources  
Hydrology Division



Preliminary Estimate of Ground Water in Storage for the  
Desert Valley Ground-water Basin  
Mohave County, Arizona

Open File Report Number 9

May 2007

By Dale A. Mason, Paul A. Ivanich, Brian D. Conway, J. Andrew Kurtz, Michael T. Winn

Arizona Department of Water Resources  
Hydrology Division

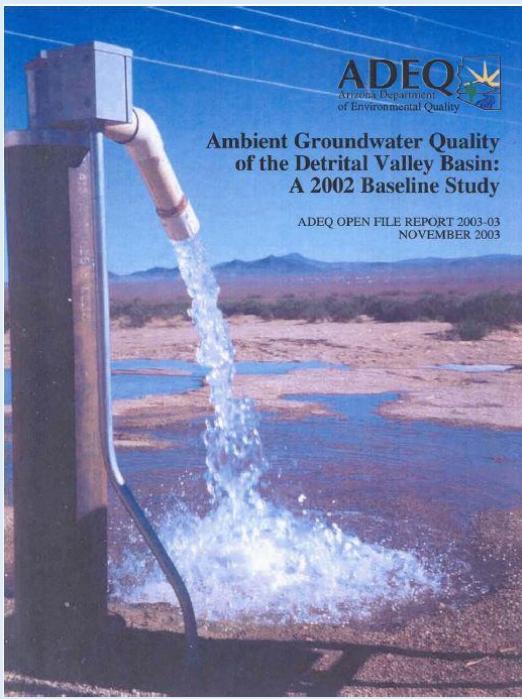


Preliminary Estimate of Groundwater in Storage for the  
Huachuca Valley Groundwater Basin  
Mohave County, Arizona

Open-File Report Number 11

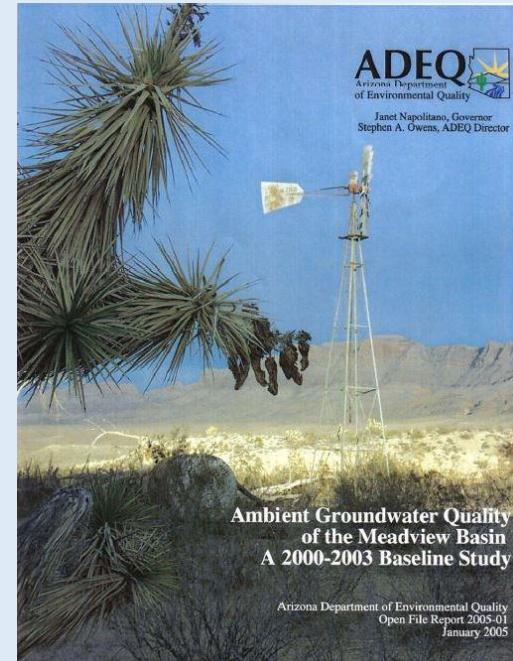
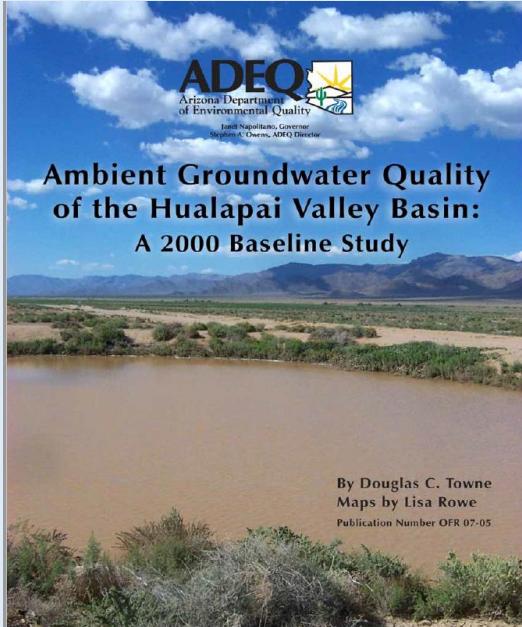
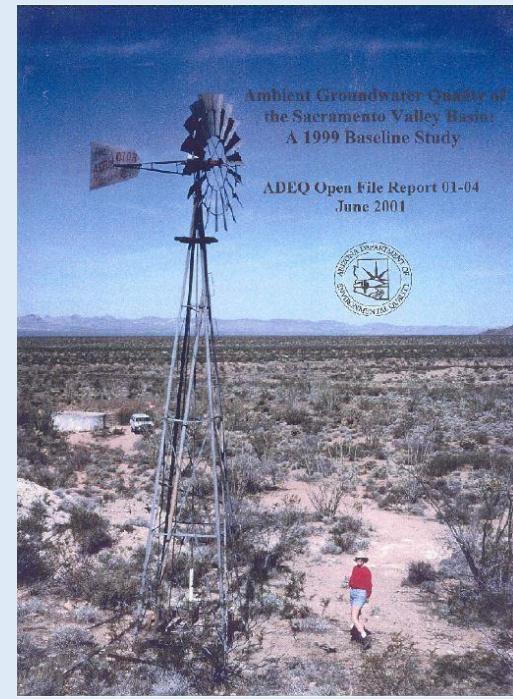
September 2009

By Paul A. Ivanich and Brian D. Conway



ADEQ Northwest Basin Water  
Quality Reports Can Be  
Downloaded At:

[http://www.azdeq.gov/environ/  
water/assessment/ambient.html](http://www.azdeq.gov/environ/water/assessment/ambient.html)



Prepared in cooperation with the  
ARIZONA DEPARTMENT OF WATER RESOURCES

**Ground-Water Occurrence and Movement, 2006, and  
Water-Level Changes in the Detrital, Hualapai, and  
Sacramento Valley Basins, Mohave County, Arizona**



Scientific Investigations Report 2007-5182

U.S. Department of the Interior  
U.S. Geological Survey

SIR 2007- 5182

Prepared in cooperation with the  
Arizona Department of Water Resources and Mohave County, Arizona

**Hydrogeologic Framework and Estimates of Groundwater  
Storage for the Hualapai Valley, Detrital Valley, and  
Sacramento Valley Basins, Mohave County, Arizona**



Scientific Investigations Report 2012-5275

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U.S. Geological Survey

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**Groundwater Budgets for Detrital, Hualapai, and  
Sacramento Valleys, Mohave County, Arizona, 2007-08**



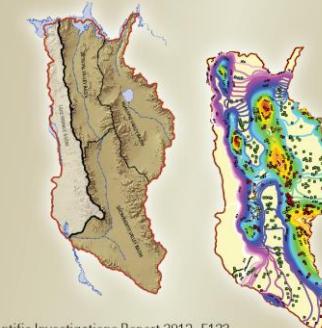
Scientific Investigations Report 2011-5159

U.S. Department of the Interior  
U.S. Geological Survey

SIR 2011 - 5159

Prepared in cooperation with the Arizona Department of Water Resources and  
Mohave County, Arizona

**Preliminary Groundwater-Flow Model of the Basin-Fill  
Aquifers in Detrital, Hualapai, and Sacramento Valleys,  
Mohave County, Northwestern Arizona**



Scientific Investigations Report 2013-5122

U.S. Department of the Interior  
U.S. Geological Survey

SIR 2013 - 5122

For Further Information Please Visit The ADWR Website at: [www.azwater.gov](http://www.azwater.gov)

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Frank Corkhill (Hydrology Division) [efcorkhill@azwater.gov](mailto:efcorkhill@azwater.gov)

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Michelle Moreno (Public Information Office) [mamoreno@azwater.gov](mailto:mamoreno@azwater.gov)